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RADIO AND HOBBIES IN AUSTRALIA

6D

REVIEW AND SERVICE NUMBER

RADIO AND HOBBIES IN AUSTRALIA

CHRISTMAS 1942-3

IN normal times, this issue would have been referred to as the Christmas issue; instead, it carries on the cover the more prosaic dateline "January, 1943." Nevertheless, it should be in your hands quite early and we would take the opportunity of extending the greetings of the season to each and every one of our readers.

In the fourth year of World War II, Christmas greetings are apt to sound somewhat out of place, for the whole inference of Christmas, and its rich spiritual background, is in sharp contrast to the carnage and suffering which defaces this world of ours. We only trust that, next time the holly is hung, it will be mid happier and more peaceful surroundings.

Of course, from a purely technical standpaint, was is interesting in that its very urgency fosters rapid scientific development. This is very evident in aviation, in sea and land transport, in medicine and surgery.

In being harnessed to the cause of war, the science of radio has not been the loser. The full story of many technical triumphs will not be told till after the war, when they are applied to peacetime requirements.

Perhaps the most obvious effect of the war on radio has been the vast development of international short-wave broadcasting, mostly for purposes of propaganda. More numerous and more powerful transmitters and a better understanding of war propagation at high frequencies have transformed the once silent short-wave bands.

In munition factories, radio and allied apparatus is performing a bewildering array of duties—speeding up production, controlling automatic machines, then sorting, testing and counting items as they come off the line. Similar apparatus stands guard day and night against fire and the entry of intruders.

In the field, radio is playing a tremendous part in achieving all important co-operation, coming into its own where the landline is inconvenient and unreliable. Most of the apparatus is quite new. Receivers and transmitters have been developed for individual soldiers and for installation in trucks, tanks and planes. In a war of machines and movement, a lot depends on having available the best possible radio gear.

Apart from these known developments are others which are referred to but vaguely, often as rumours. Radio location is a comparatively new application which served Britain well during the air blitz. There have been reports and rumours of guns aimed by radio, of radio-directed missiles. We can take it for granted that technical men all over the world are working along these lines and along the lines of remotely controlled tanks, aircraft torpedoes and attack ships. Who knows but that some of these things are already an accomplished fact?

Such is the versatility of radio that little if any of this wartime research and development need be lost. We trust that the same transmitters which now pour out subtle propaganda will become instruments of international goodwill; that wartime development will give us better receivers and amplifiers; that all these other devices, still on the secret list, will be turned about face to contribute to the safety of mankind.

W. H. Williams

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SCIENCE AIDS THE MAN ON THE LAND

Because of their ability to travel at a comparatively slow speed, autogiros are particularly suitable for dusting cotton and other crops. Here an autogiro climbs steeply at the end of a run over a field to avoid the trees at the edge.

In time of war we are apt to get the idea that application of science and mechanics is directed exclusively to the perfection of means of destruction. It helps our perspective of the war —and of peace—to remember tha progress is still being made in the scientific approach to increased production, not this time from factories and steel foundries but from that vast warehouse of wealth which can never be exhausted—the earth.

COTTON is one of the vital necessities that springs from the earth, and every year a group of the most unusual and hard-flying pilots known to the air industry trek to the cotton plantations of Dixie.

These men, after the cotton season begins near the middle of June, take up temporary residence at some convenient centre in the cotton country with but a single thought in mind—dusting cotton for the prevention of infestation by the dreaded boll weevil and army worms.

Whether young or old, these men are trained in this discriminating work almost to the point of exclusiveness and for a period of two months they are to be an important cog in one of America's leading industries—cotton.

Their work is so specialised that it requires more than mere hours in the air to prepare them to perform the numerous tasks connected with the job of dusting. From before daylight until well after dusk, they are occupied with the work associated with dusting —looking over acreage for future dusting, fixing in their minds the location and contour of the acreage to be worked, and, most important, checking the condition of the plane.

A stall at 10,000 feet may be annoying, but not necessarily fatal. A stall at 10 feet . . . well, the pilot does not know much about it!

Should you be an aspirant to the business of dusting and make application to some company, you will be asked for a resume of your experience as a pilot, and should this seem satisfactory—and the concern needs a pilot —you will receive instructions to report for a tryout prior to the opening of the season.

by L. B. Montague

On arrival at the field you will be escorted to a training ship. You crawl in the back cockpit and the chief pilot gets in the front, after first explaining the procedure of dusting. Then he will take off and select a field suitable for the test, and make a couple of trips across the plot to acquaint you with the procedure.

Then you take the controls—and you'd better be good. If you pass the test and are put on the payroll, you still must serve a season or two as an apprentice, taking the small and left-over jobs.

Even though the work sounds exciting and the remuneration is somewhat above the average, there is plenty of hard work, long hours, nerve-wracking experiences and much else to test not only flying skill but also the ability to take it day after day.

EARLY EXPERIMENT

Since the early days of cotton planting, the boll weevil and army worm have been a menace, and the planters have been frantic for years in an effort to contrive a means of coping with the ever-present pestilence that yearly punctures the tender boll of millions of plants.

In the early days there was much experimenting with numerous types of poisons, the dust being applied by hand, but with little success. Later, the many farm machine manufacturing companies attempted to develop an effective machine to spread the dust on the precious young cotton from the ground. Even this method was not completely successful.

Then someone conceived the idea of spreading dust from an aeroplane, and the present satisfactory kill was ultimately accomplished. Naturally, adverse criticism had to be faced in the early stages and improper equipment, insufficient knowledge of the correct procedure of application and numerous other contributing factors retarded the advance of this phase of flying.

From that meagre embryonic period, they have progressed to the present-day immense set-up of the various companies with their modern equipment. Largest among these concerns is Delta Air Lines, operating a dusting branch in addition to their airline, yearly dusting cotton throughout the Southern States and later journeying on into the Florida district for citrus dusting during the winter months.

DUSTING PLANES

The planes are either designed and built primarily for dusting purposes, as the Hudd-Delands of Delta, or—a more common procedure—are converted ships such as Stearmans, Wacos or similar types.

To convert a three-place ship such as a Stearman to a duster, the front cockpit is stripped of all the interior and a galvanised or aluminium tapering hopper built in, utilising as much of the available space as possible. After the metal is patterned and placed it is either riveted or bolted, the overlapping joints and cracks being caulked somewhat as a boat would be to pre-

AIRCRAFT FIGHT PESTS, SOIL EROSION

vent the dust from leaking.

The top of the hopper is as large as the original cockpit opening, and is covered by a metal, hinged door. The bottom of the tapering hopper has an opening six or eight inches wide, and 24 to 30 inches long. The flow of the dust is regulated by a sliding door controlled by a handle from the cockpit.

DUSTING MECHANISM

Inside the lower hopper is a revolving agitator to prevent the dust from packing down and hindering the flow through the opening. The shaft of this agitator extends to a gearbox on one wing, to which is attached a small propeller which furnishes the power necessary to revolve the agitator.

Attached to the hopper opening is a box-like enclosure, called the venturi, with the front and back ends open to collect the prop blast and forming a wind tunnel, thus spreading the dust over the terrain as soon as it is released from the hopper door.

The smaller ships have hoppers capable of carrying about 500 pounds of dust, while the larger ships may carry as much as 1000 or 1200 pounds. Some of the normal plane equipment, such as the altimeter, bank and turn, and other similar instruments are removed to eliminate excess weight.

As soon as there is enough light for the pilot to find his landing field, he takes off into the early morning haze straight for the plantation where he is to work. Arriving there, little time is wasted in loading the dust. This is directed by the pilot supervising the work of a number of negroes.

The dust usually is a calcium-arsenate solution, although a sulphur solution may be employed in severe cases. The dust comes packed in drums of a hundred pounds net weight.

ALTITUDE FIVE FEET !

After loading sufficient dust, the pilot takes off and flies to the fields to be dusted. These fields range from five to as many as 1000 acres. The larger the acreage the easier for the pilot, because he has fewer turns to make.

The actual dusting is accomplished from an altitude of about five feet above the crop, depending on the desires of the planter. The application of the poison usually is from five to ten pounds to the acre, this also at the discretion of the planter.

Approaching the field, the pilot lines himself up with the proper direction of his row or swath and throttles back to the proper cruising speed. This ordinarily is as slow as possible to effect a more even and complete coverage and prevent "boiling" of the dust caused by excess prop wash. As the ship passes over the end of the patch the hopper door is opened to the correct space to allow the estimated poundage per acre to go through the venturi.

Wheels barely missing the stakes, a light plane skims above the crop. Speed must be as low as possible—but not too low. A mistake at this altitude spells disaster.

The pilot must now plan his rows as to length, width, straightness, and also be watchful that his hopper agitator functions properly so as to prevent clogging at the door.

EXPERT FLYING

But, most important, he must constantly be alert for stumps, cotton houses, cypress snags and any other obstruction that might appear in his path.

Approaching the end of the field the throttle is opened to gain speed for the climb and turn, the hopper door is closed as the ship leaves the field and the turn is started, usually a normal climbing turn.

While in the climb a reverse turn is negotiated in such a manner as to align the ship with the next swath. At the peak of the turn the throttle is again eased back and a new approach is made into the cotton, this time some 50 or 60 feet over from the last application. On entering the field again, the hopper door is opened and a repetition of the former trip is made.

If there are no obstructions at the end of the field, the turn at the swath's end may be made at a low altitude, but as the most productive soil is usually adjacent to a wooded area, the end turns are nearly always something to be reckoned with in order to blow poison into the end regions, and still gain sufficient altitude to clear the obstructions without incident.

PLENTY OF WORK

This particular phase of dusting is the one with which most pilots are concerned, because a motor failure at this point, with a load of poison is extremely dangerous.

During a morning or evening session, a pilot may have two or three jobs near each other. Also, there is the possibility of rain washing the dust off before it has become effective, necessitating another application. To be really effective the poison should be on the cotton for at least 36 hours.

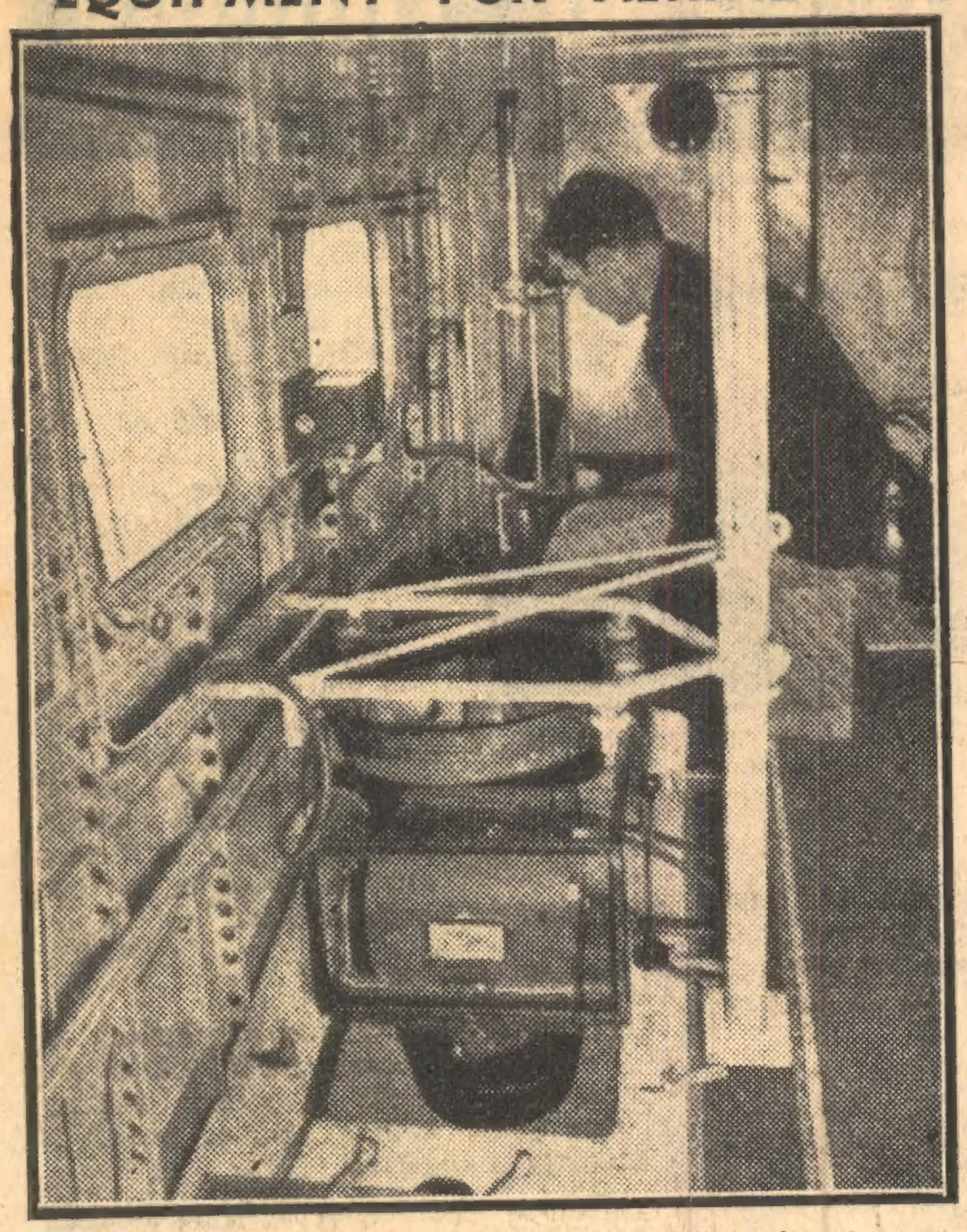
There is another field in which the plane, allied this time with the camera, does a real job of work for the man on the land. That is in soil conservation. The present conflict between

(Continued on Next Page)

In parts of USA particularly, soil erosion threatens disaster to farmers. Racing floodwaters wash the fertile soil from hillsides, burying low-lying crops or carrying the soil out to sea. Picture shows a crop of young corn deep down in a layer of silt—precious soil from a farm higher up.

FEATURE STORY

EQUIPMENT FOR AERIAL PHOTOGRAPHY



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A view inside a plane used for aerial photography and mapping. Operating automatically, when necessary, the camera photographs large tracts of country as the plane travels a prescribed course. To the trained eye, the photographs reveal any tendencies to soil movement, allowing preventive projects to be put in hand in time.

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(Continued from Previous Page.)

man and erosion is being fought on the ground, but to win it soil conservationists are taking to the air.

The United States is leading the way in the scientific attack on the problem of soil erosion. The US Department of Agriculture has established demonstration projects in 11 regions throughout the country. The real purpose is not to attempt to cure all the ills of all the farmers, but rather to educate those who till the soil in the wise and conservative use of the two basic resources, soil and water.

To establish projects, reconnaissance surveys followed by detailed maps must be made, and here is where the aeroplane performs its first service, for soil men and engineers must have these facilities made possible by the aeroplane.

HUGE PROJECT

To fill the needs of the Department of Agriculture for the projects in the 11 regions of the US selected called for the biggest job of aerial mapping that had ever been undertaken. It meant that planes manned by aerial photographers would fly over every State and county, mapping every town and farm, hill and valley.

The largest of these surveys was carried out by the Fairchild Aerial Surveys, Inc., who mapped 25,560 square miles of watershed in the Hopi, Navajo and Zuni Indian reservations of Arizona, New Mexico and Utah. This was the largest mapping job ever done in the United States, and it required 300 hours in the air over a six months' period of completion.

Similar work was being done by 40 or 50 other planes in various sections of the country, each turning to its part of the finished picture, which, because of its gigantic size, will, of course, never actually be assembled in one print, but will be made up of some 333,000 photographs, each two feet square.

As they are completed they are turned over to the Washington office of the service for distribution to the field, where they are used immediately in the planning and development of projects.

TRAINED OBSERVERS

To the average man who has spent his life on the ground and has developed the viewpoint of the caterpillar, these maps would be meaningless, and a trip by air would be a total loss, as from this new position high above the usual point of view they are unable to pick out objects with which they are ordinarily familiar.

To the engineer or soil man, maps are like hammer and saw to a carpenter, and when he takes to the air with a project map across his knees, looking from the window of the plane, he sees below him the inter-relationship of the erosion problems, control measures or soil types indicated on his map as though he were viewing a gigantic enlargement with perspective added.

QUERY SERVICE

It is regretted that, owing to Office arrangements, it will not be possible for us to answer technical queries by mail during the months of December and January, ordinary queries will, however, be answered through the usual columns on page 59.

In carrying out a soil conservation survey an aerial reconnaissance is first made. This makes it possible to cover quickly large areas that, on the basis of their aspects, seem to justify more intensive treatment. Next the aerial maps are made.

Provided with these, a ground party makes a survey in detail, inking in symbols on the maps which, to the trained user, stand for types of soil, forest cover, vegetation, water facilities, etc.

Lastly, after completion of these maps, they are taken into the air where the entire area is again studied, but this time with the added detailed information filled in by the ground crew. By this method a true understanding of the problem can be gained.

"BEFORE AND AFTER"

In some regions when projects are getting under way and sites for future work have been selected, the regional photographer will fly over the area on which work is to be done for the purpose of making preliminary photographs which will be used with later photographs as "before and after" records of progress. Part of the education of the general public in the importance of soil conservation is carried on by the release of these photos to the Press.

One early morning, residents of Santa Paula, California, were awakened by the smell of smoke and the screech of fire sirens. A 12,000 acre brush and grass fire was stripping away the protective cover of the entire watershed above a demonstrational area just south of the city.

This meant that during the months to follow, dams calculated to control certain gullies and withstand a specified run-off would now be required to handle an increased load, as flood waters would hurtle down canyon slopes using the ash-covered watershed as a toboggan. This fire would have a far-reaching effect on the success of the structures and erosion control systems being demonstrated in the area.

The pilot of the contract plane was hurried out of bed, and, together with a photographer, flew over the fire zone. A photographic record of the affected watershed was made, and from these photographs it was possible to estimate the extent of the damage.

PROTECTIVE COVERING

Immediate plans were laid to provide a protective covering of vegetation for the sections from which all grass and brush had been burned. Field surveys were made, and almost before the slopes had cooled, Government men were re-seeding the hills and planning emergency controls which would be needed in the event of another heavy rain.

During California's worst flood in 40 years, increasing rainfall on land already saturated caused thousands of tons of rich crop producing top soil to be washed from clean cultivated slopes.

Rain fell in seemingly impossible torrents, transforming small gullies

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"HOW IT WORKS"—BY R. M. YOUNGER

THE DRY GAS METER

ONE of the most ingenious of the numerous meters in general use is the gas meter, a cut-away sketch of which is shown here.

Known as the dry gas meter, it is, in essence, a machine with bellows of known capacity, which are alternately filled with gas and emptied, the pulsations being recorded on a register. The pressure of the gas is the motive force, and the changes in direction of motion of the bellows are regulated by inlet and outlet valves.

The process can be followed from the diagram. In practice, the gas from the service pipe passes to the shallow upper chamber, known as the valve gallery. It leaves through valve-openings or ports. There are two valves, each with three ports. In each case, one port leads to the pipe from the main, one to a bellows, and the third to the space surrounding the bellows.

A wall or diaphragm divides the lower section of the meter into two compartments.

Looking at the sketch, you see that gas is entering the port of the rear bellows, causing the bellows to expand. As it does so, the bellows moves a pivoted arm attached to it, and this, in turn, turns an upright rod. This upright rod is connected by means of a system of levers and a bevel gear to a spindle, which is rotated, thus turning the dial of the meter.

THE VALVES

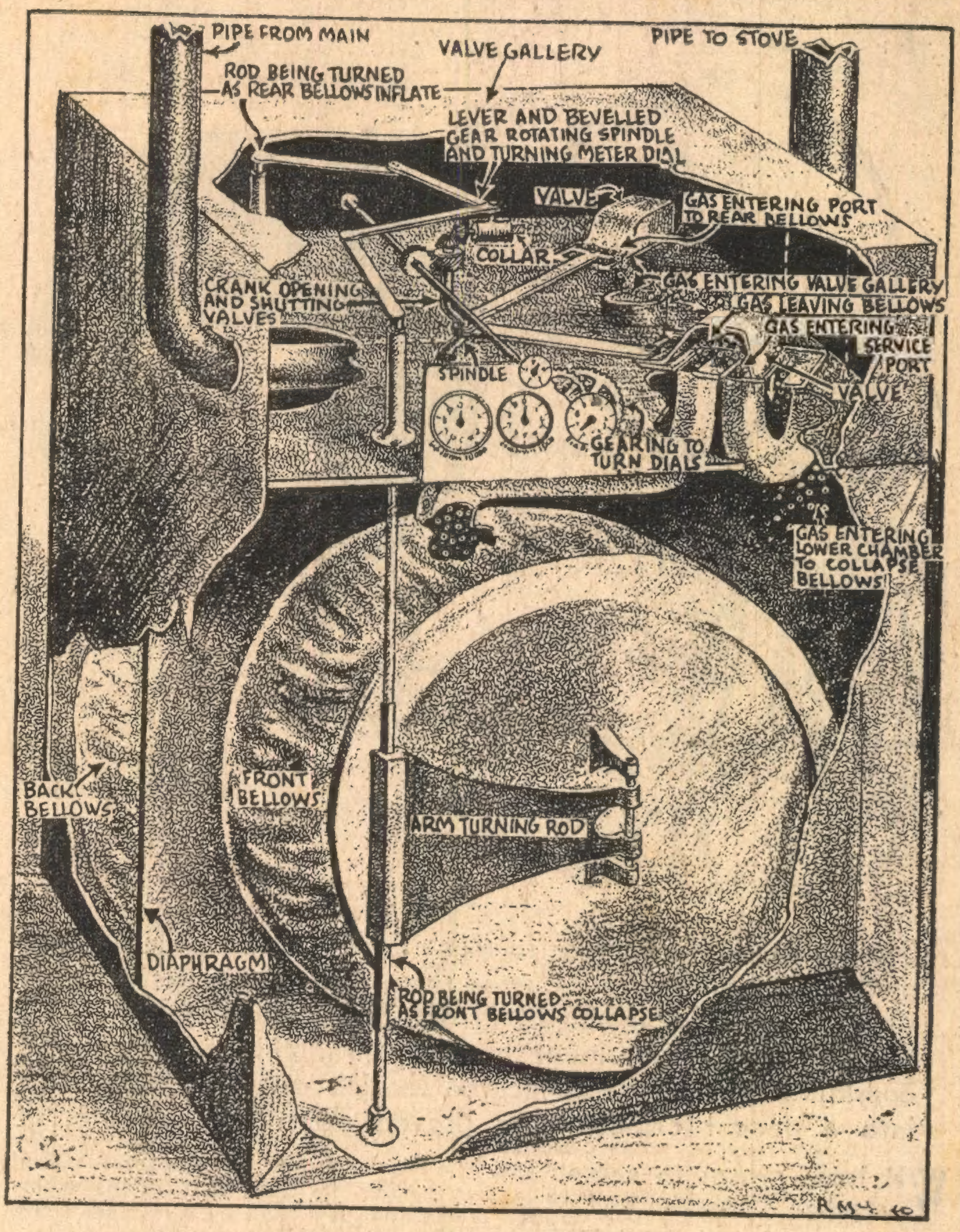
The spindle is bent so that it forms a crank-rod, and as it turns it moves two levers connected to the valves. At the stage shown on the drawing, the front valve is drawn inwards, allowing gas in the bellows to pass through the service port into the pipe to the stove.

While this is happening, gas is flowing from the inlet pipe to the space around the bellows. The pressure causes the front bellows to collapse and empty.

The back bellows then fills and operates, and so the two go on working alternately as long as gas is passing through the meter.

The more gas jets you have turned on, the faster does the gas flow through the meter and the faster do the little pointers on the front rotate. The pointers indicate the successive digits in a complex number.

When the reader comes around, he jots down the number indicated on the dials, subtracts the number recorded on his last visit and sends in an account for the difference.



BRAIN RESEARCH INSTITUTE

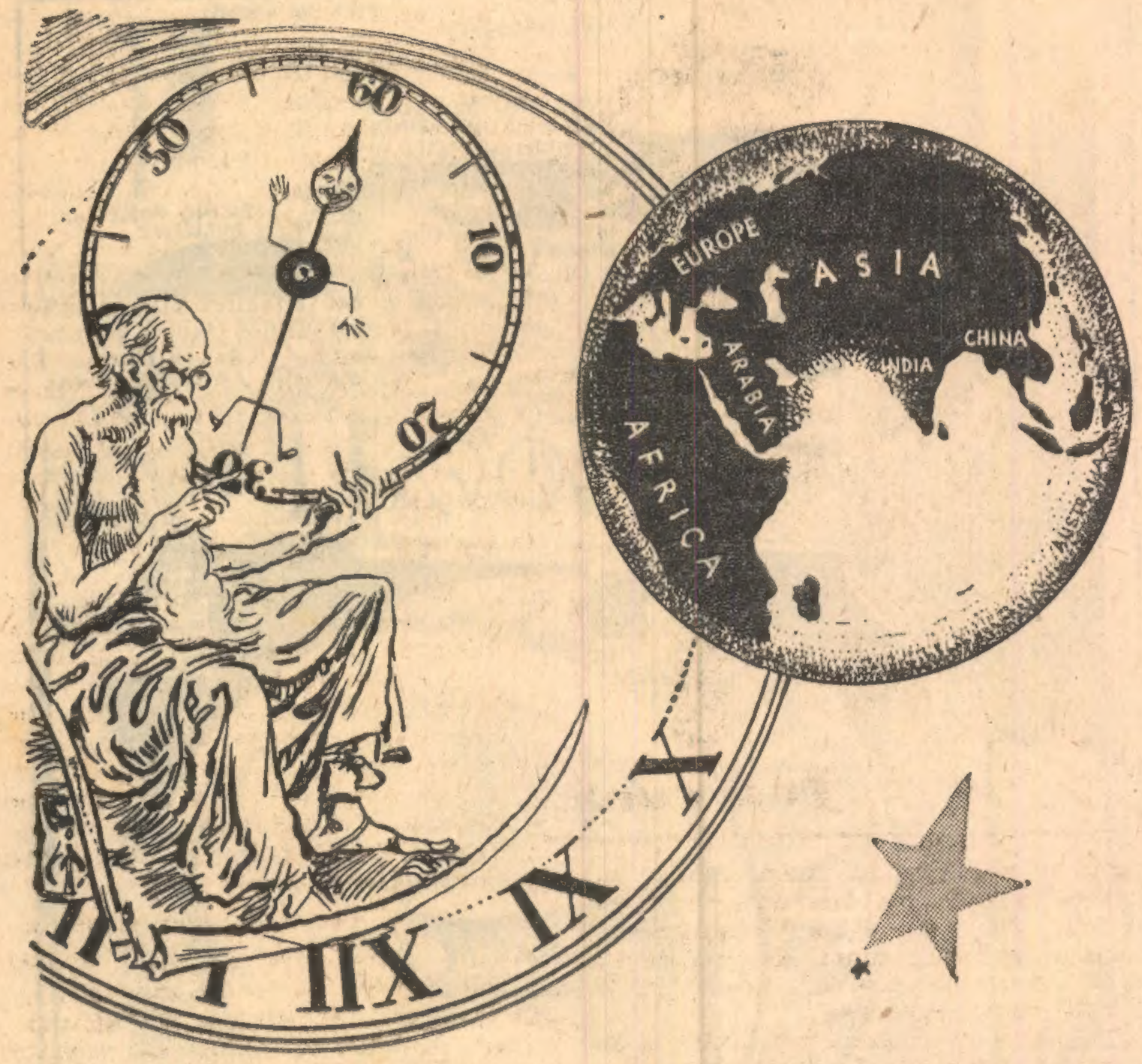
IN Georgetown University, Washington, DC, there exists what is probably the world's most fully equipped brain research institute. Over 5000 human and animal brains are available together with such important equipment as cameras, projectors, &c. The institute is under the direction of Dr. Othar Solnitsky, and its findings are open to brain students, surgeons, and scientists from all over the world.

In one laboratory a Vogt-Sartorius brain microtome is used to cut sections of the brain. Such sections are usually cut at a thickness of 50 microns (50/25,000 in.). The brain is placed in a large round central cavity in the machine and an upper rectangular space is then filled with 70 per cent. alcohol.

By rotating a handle, a large brain knife slowly cuts off sections after section until the whole brain is cut. As the section comes off the knife it floats in the alcohol from which it is carefully removed. In this way perfect serial sections are made. Not even one section is lost in the serial cutting of an entire human brain. The object of the research is "Practical use in understanding human conduct, and for application in diagnosis and correction."

FEATURE STORY

THERE ARE CENTURIES OF ADJUSTMENT



Some regard calendars as so much useless junk. Others, the methodical among us, look upon them as useful gadgets upon which to mark forthcoming engagements, gala days, rent-due days, birthdays and Fridays-the-Thirteenth. But have you ever considered just how complicated the job of fitting the year into a decent calendar has proved down the centuries?

by R. M. Younger

WE have grown to accept December 31 as the end of the year, and nobody ever quibbles for any other date than January 1 as the beginning of the next "Happy and Prosperous New Year." But it was not always so and, in earlier times, the calendar occasionally caused much bother—particularly with regard to the official beginning of the New Year.

There have been a few New Year's Days at odd times in English history. The new year began on Christmas Day up to 1066, but William decided that January 1 was a better date; and so it was until 1155, when a good many people who thought they knew said they were certain the year ought to begin at the vernal equinox—March 25.

The change was made, and it was not until 1751 that it was ordained that the day after December 31 should be forever known as January the First, whatever it had been called before, and that it should be New Year's Day.

For thousands of years man has been attempting to adjust his calendar so as to make the same day come round regularly in the same season year after year. (Just in case you don't know, the calendar is defined as "a means of distributing time with respect to its natural divisions in periods for the purposes of civil life").

The trouble with calendar-making has been that the year, according to the sun, is not exactly 365 days, but a fraction over. This fraction is odd, amounting to five hours, 48 minutes and 46 seconds—not serious for a year or two, but in the course of time amounting to several days.

The Egyptians were the first to have a calendar. Their year consisted of 12 months of 30 days, together with five supplementary days. Calculating the year in this way, they lost one complete day in every four years, and this in the course of centuries led to a complete revolution of the seasons.

ROMAN CALENDAR

Then came the Roman calendar. Originally it consisted of only 10 months, which began in March and ended with December—hopeless, of course, for it allowed for only 304 days, and no known arrangement was made for the remaining days.

Numa added two extra months, January and February, but he put them the other way round, and it wasn't till 452 BC, that they were reversed. He realised, too, that the calendar year was all wrong with the sun.

The only thing he could think of was to insert a little month **every second year** between the 23rd and the 24th of February, consisting of 22 and 23 days **alternately.** That made the average year 366¼ days, just one day too long.

However, Numa's nimble brain found a way of getting rid of the odd day over a period of 24 years, thus bringing the average year down to 365¼ days, nearer the mark, but still not near enough.

By the time of Julius Caesar, the vernal equinox, instead of being March 25, was several weeks out. Caesar, in 46 BC, had to put in two extra months to get things straight with the sun again. One of these months had 33, the other 34 days. The year, therefore, contained 445 days. No wonder it is called the Year of Confusion!

CAESAR'S CONTRIBUTION

Having done that, Caesar, with the help of Sosigenes, an astronomer from Alexandria, said that the year must be 365 days long in future, and once in every four years a leap year of 366 days must be allowed for. He then decided that the number of days in the months should be 30 and 31 alternately, with the exception of February, which had 29 days in ordinary years and 30 days in leap years.

This order was upset by Emperor Augustus, who named the eighth month after himself, and then objected to July (named after **Julius** Caesar) having 31 days when his own month, August, had only 30. Therefore, a day was snipped off February and given to August just to satisfy the vanity of the Roman Emperor.

That meant that July, August, and September all had the 31 days. It was thought better not to have three months in succession with the maxi-

BEHIND PRESENT CHRISTIAN CALENDAR

mum number of days in them, so September's and November's last days were cut off and given to October and December instead, thus making necessary the "Thirty days hath September" jingle, and also accounting for July and August being the only two months in succession with 31 days.

Caesar thought he had straightened everything out by his arrangement, but he was mistaken. The Julian calendar was really 11 minutes 14 seconds too long. After 15 centuries the discrepancy amounted to 10 whole days, and in 1582 Pope Gregory suppressed 10 days in the calendar. People's engagements between October 4 and October 15 of that year just faded out. And the people didn't like it.

GREGORIAN CALENDAR

Gregory's arrangement got over the difficulty of the odd hours and minutes by having the leap year of 366 days once in four years, as before, but he decreed that the centurial year should be a leap year only if its number were divisible by four, otherwise it should remain an ordinary year. Thus 1600 was a leap year, but not 1800 or 1900.

Those who live in 2000 will chalk it up as a leap year, however. Even now there is a discrepancy, but it amounts to only one day in 3886 years—forget it if you like!

England would not accept the Gregorian calendar for a long time. When, in September, 1752, England did do its duty and struck out 11 days from its calendar, making September 3 September 14, there were frayed tempers and even riots, as the people demanded that they be "given back" their 11 days. But the Government took them all right, though nobody really knew what became of them. . . .

His Majesty's Treasury in Britain is certainly a conservative institution. It still will not believe that January 1 makes a good start for a year, and sticks to the Old Style reckoning, in which the year commences on March 25. That is why the financial year, beginning at the Twelfth Day, commences at such an odd date as April 5.

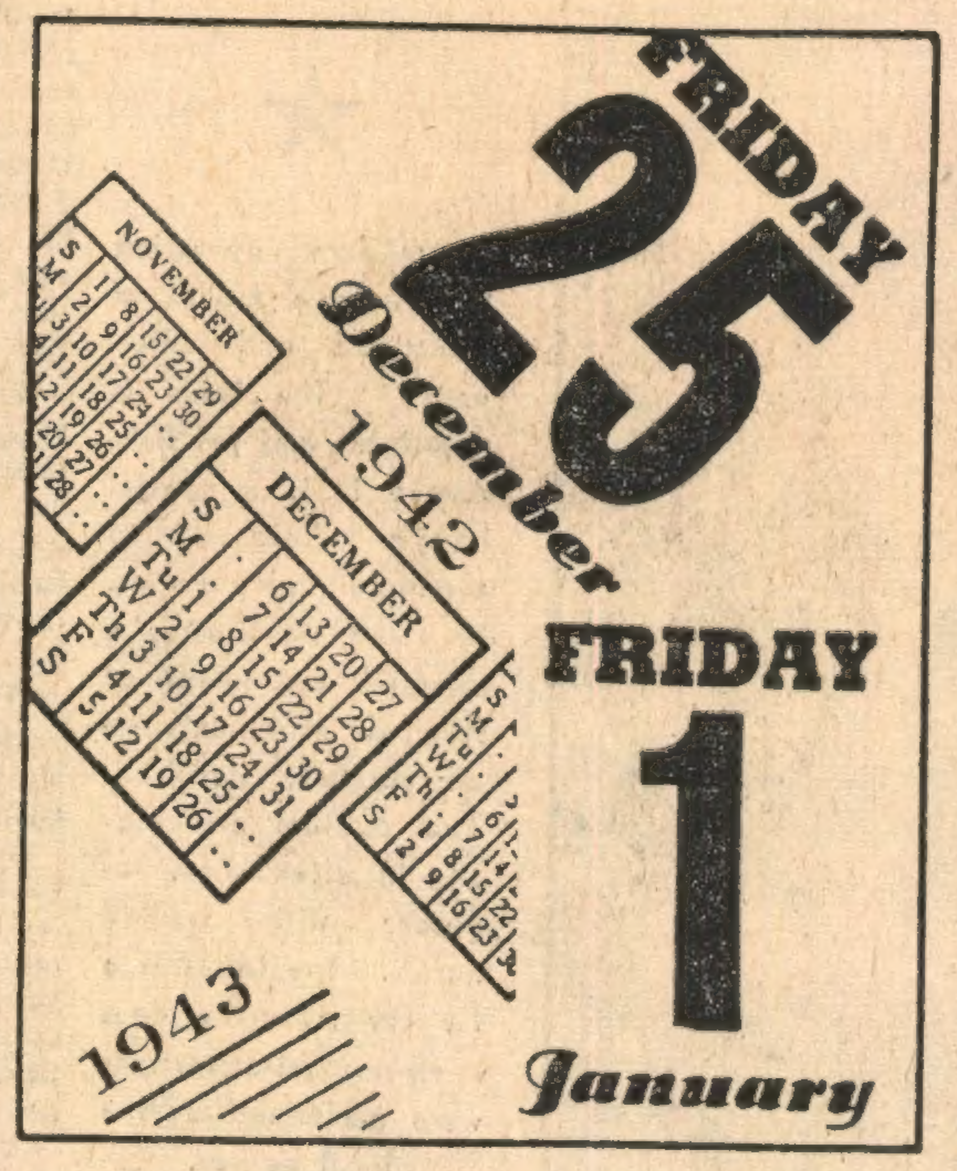
JEWISH YEAR

The Jewish year consists of 12 or 13 months, according to whether the year is "ordinary" or "embolismic." The ordinary year has 354 days, but the embolismic 384, obtained by the inclusion of a month of 29 days, called Vaedar.

This intercalated month occurs seven times in a cycle of 19 years, and readjusts the Jewish Year with the Solar year. The date is calculated back to the Creation, which is computed as having taken place 3760 years and 3 months before our Christian era.

The era of the East is dated from the first day of the month preceding the flight of Mohammed from Mecca to Medina, and began, therefore, on July 16, 622. The year of the Mohammedan calendar is purely lunar, and composed of 12 lunar months which consist of 30 and 29 days, respectively.

The years are divided into cycles of 30 years, of which 19 are ordinary, while the remaining 11 contain an extra day added to the last month of the year.



The months run through all the seasons in the course of about 32½ years.

Our Christian calendar is simple by comparison with these and other calendars that have been used. Thank goodness it is less complicated than the old Roman system. This is how it worked: The days of the month were calculated **backwards** from three fixed periods, the Calends, the Nones, and the Ides.

The Calends were always the first day of the month, the Nones always the ninth day before the Ides, and the Ides in the middle of the month, either the 13th or the 15th.

WORK THIS OUT !

The method of calculation was as follows: The days between the Calends and Nones were the days before the Nones; the days between the Nones and the Ides, the days before the Ides; and the days between the Ides and the end of the month, the days before the Calends. In the calculation of the day of the month, the days were calculated inclusively.

Yes, our calendar has its imperfections. It is, we know, likely to be one day out in 3886 years. Seasons seldom tally with our conceptions of "normal" weather, and Easter jumps about most disconcertingly. For all that, it is easily followed, and far less complicated than other calendar systems, it seems.

SCIENCE AIDS THE MAN ON THE LAND

(Continued from Page 4)

into yawning chasms in the span of minutes. Soil-laden water filled outlet ditches to capacity and overflowed their banks, spreading out over valuable crop lands on its race to the sea.

This extra burden of soil and water gorged the river channels. Their courses were changed completely, and, lashing from side to side, muddy waters tore at unprotected banks, cutting away block long strips of prize orchard land, eating back at the rate of five or six feet a minute.

Tree by tree, row by row, whole walnut groves that had been producing crops for fifteen years toppled into the river to be swept away.

As quickly as weather conditions permitted and damage could be repaired, a plane took off from the Santa Paula aerodrome where shortly before the runway had been covered by two feet of water and spread over with a layer of thick silt.

It followed the course of the Santa Clara River, now widened in spots to three times its original size, to the ocean. From above, the deposit of soil in the surf stood out in colorful contrast like huge chocolate malt poured in a sea of ink. Here was a heartbreaking scene as tons of fertile California soil slowly settled out of sight, forever lost to the farmer.

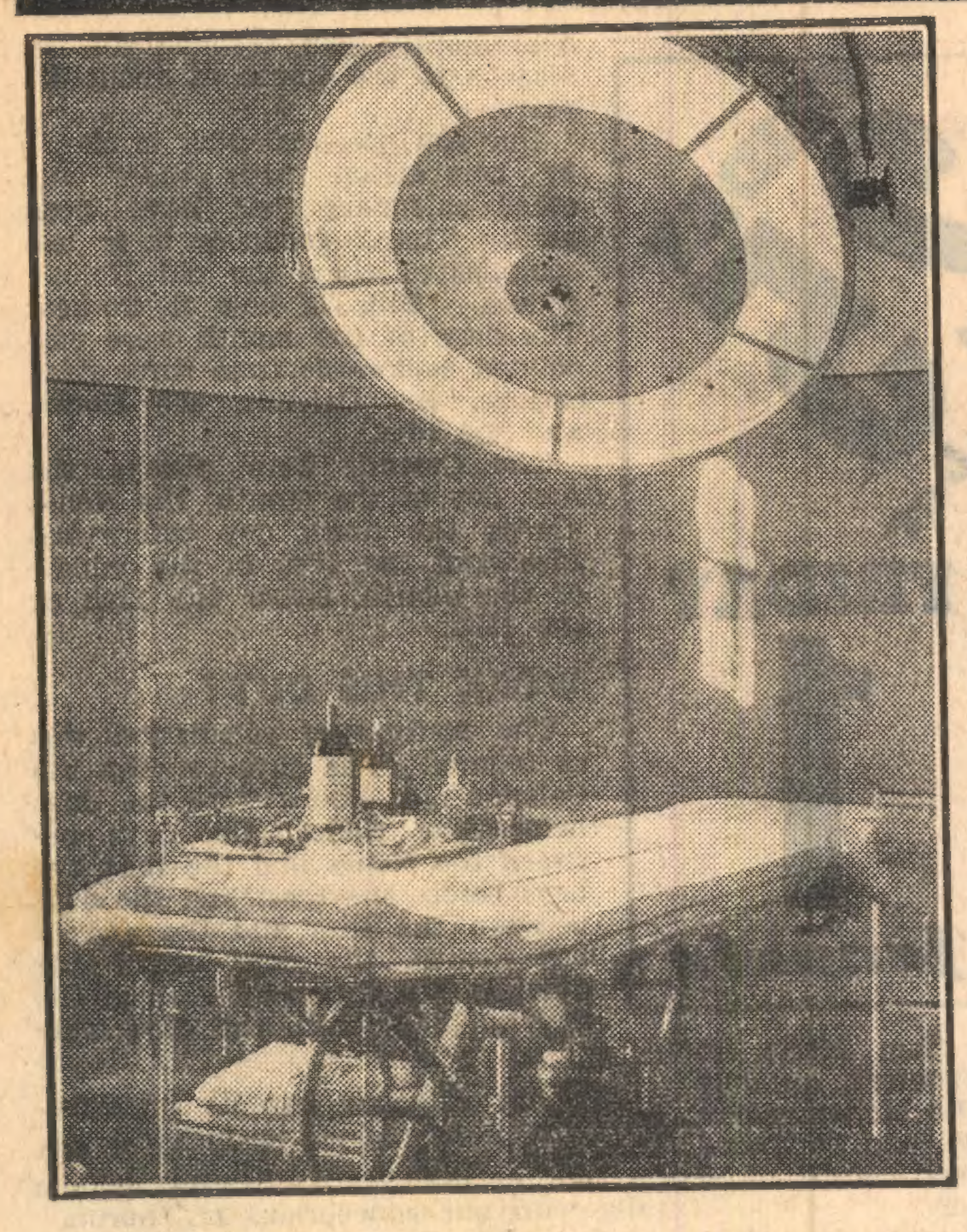
SEEING IS BELIEVING

Farmers who had never bothered to walk or drive around and examine neighboring fields where soil losses had been heavy changed their attitude on seeing the abovementioned and other graphic pictures of what could happen to their land.

Their previous stand of non-cooperation altered as they realised that their current neglect of the problems of soil erosion would adversely affect their livelihood in five, ten or twenty years time.

Though not so spectacular as our air fighters, and not doing a job that seems of immediate importance, the cotton dusters and aerial photographers are striving to hold intact something of the present for the future in a world that seems bent on self-destruction.

PROGRESS IN THE CONQUEST OF PAIN



A modern operating theatre is a model of cleanliness and efficiency. The table is adjustable and yet firm. Above it is a special lamp designed to eliminate shadows. Wheeled trays carry a selected assortment of surgical instruments — all carefully sterilised. Two doctors are usually in attendance, together with trained nurses. The whole is a far cry from the days when surgical operations were performed by the local barber.

The conquest of pain in surgical operations is perhaps the greatest contribution that science has given to medicine. It is almost certain that, without this great advance, the progress of surgery would have been considerably retarded. Indeed there would have been little progress at all, for experimental surgery would have been impossible except on dead bodies.

IT is a far cry from the butchery of the early eighteenth century to the refined surgery of today. Directions for the carrying out of a surgical operation in the year 1800 would run somewhat like this:

"Having in the first place enticed the patient to quaff two or three gills of the best Jamaica rum, in this manner considerably reducing his powers of resistance, he is now to be secured to the earth by means of stout ropes attached to his legs and arms and across his middle and tightly tied to stout stakes driven into the earth.

"That portion of his body into which the knife is to be plunged is now to be exposed, and the knife, which in the first place has been sharpened at the local forge, he being in the most favorable circumstances to do such a thing, is taken in whichever hand is convenient, depending as to whether the surgeon is left or right handed. The knife, after carefully wiping on the sleeve of the coat, is now plunged into the body.

"This act may cause protest on the part of the subject, and, if he should struggle, it is desirable that several strong and hearty men should sit on his head and body. In this way it is possible for the surgeon to complete the operation, which will probably bring about the death of the patient, in any case. But it is better to have him die in this way rather than he should die naturally, and nothing at all done to stop it."

Many were the methods that were tried in an endeavor to allay the pain of operations. Drugs and alcohol, numbing of the flesh by pressure and cold, and even hypnotism were tried.

Knocking the patient unconscious by a lusty smite on the jaw or the back of the head was another rather unsatisfactory way. The difficulty here was that there was a danger of fracturing the patient's skull. This meant an additional operation, and the same method of "anaesthesia" could not be repeated; you could not very well hit a man on the head when he had a fractured skull, for fear of aggravating the trouble.

The net result was that patients were rather reluctant to agree to any but minor operations. For these, attention could be diverted from the job in hand by means of a troup of jesters, or a fakir, or perhaps a band of musicians—if one could afford such things.

EARLY USE OF ETHER

However, the position was improved in 1842, when Crawford Long, a physician of Georgia, in America, removed painlessly a small tumor from the neck of a patient. During the operation the patient inhaled the fumes of ether. This substance had been known for many years, and doctors were aware that it could cause a seeming intoxication and unconsciousness if its vapors were inhaled.

Before this, in 1800, the English chemist, Sir Humphrey Davy, noted the fact that the gas, nitrous oxide, if inhaled, produced unconsciousness, but no one actually made use of this gas for about 45 years afterwards.

Both these substances, ether and nitrous oxide, are widely used today.

These early discoveries were the signal for further research, and, in course of time, many new substances were found that could be used as anaesthetics.

So, today, we have such chemicals as chloroform and cocaine, with its variations such as percaine, procaine, novocaine, &c.; then we have ethyl-chloride, paraldehyde, avertin, nembutal, cyclobarbital, and a host of others.

GENERAL ANAESTHETICS

Some of these are used mainly for general anaesthetics, that is, for producing unconsciousness. Others are used as local anaesthetics, deadening the tissues surrounding the seat of operation without producing unconsciousness.

Ether, chloroform and ethyl-chloride are the most widely used of the general anaesthetics.

Ether is a colorless, highly volatile liquid, made by the distillation of ethyl alcohol and sulphuric acid.

This anaesthetic is usually administered by means of a mask placed over the mouth and nose. Ether is dropped on to the mask and the fumes inhaled, until tests show that unconsciousness is complete.

The chief advantage of ether lies in the fact that it is less toxic to the central nervous system than chloroform; in other words, there is less shock to the patient.

The disadvantages are the time taken in bringing about unconsciousness. This

by Calvin Walters

SURGEON'S KNIFE HAS LOST IT'S TERROR

means that there is a more prolonged period of excitement for the patient, which is detrimental to some. Ether also tends to irritate the bronchial mucous membrane.

As a general anaesthesia, ether produces less depressing action on the heart than chloroform.

Chloroform is probably the best known of the general anaesthetic drugs. When inhaled, chloroform has a sweetish odor and produces a feeling of warmth in the throat. It is not suitable for administration to people suffering from diabetes, heart or kidney disease or to those suffering from shock.

Chloroform is not suitable for operations on patients suffering from septic complaints. A good example of its use is in operations on the upper abdomen near the lungs. The reason for its special adaptability in this type of operation is that its use is not attended with any over-exertion of the respiratory organs and thus the operation can be performed without hindrance in this regard.

USE OF CHLOROFORM

The advantages of chloroform are its more pleasant odor and the rapidity with which anaesthesia is produced. It is also less likely to cause bad after-effects, such as vomiting and irritation of the lung passages.

It is interesting to trace the typical procedure in the administration of chloroform. Here is the story taken from a standard text book:

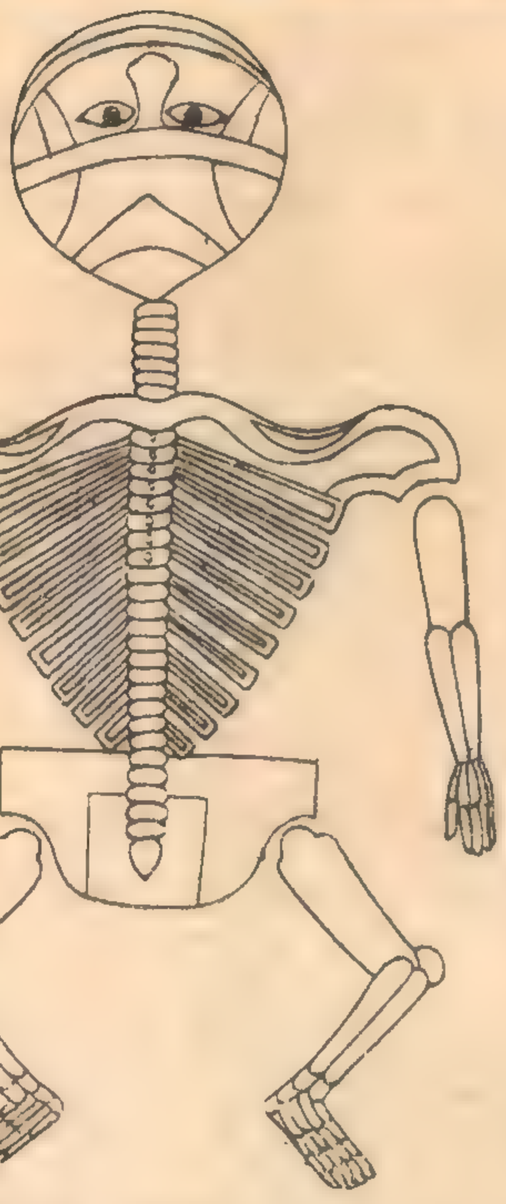
"The patient, who has been breathing steadily and counting aloud begins to waver and make errors, and then passes into complete anaesthesia. The pulse slows down and becomes regular, the respirations become regular and blowing, the flaccid cheeks being puffed out with each respiratory effort; the whole muscular system becomes limp, and the pupils become moderately contracted and fixed. The chin must be maintained, pulled up; the respiration must always be audible, even loud; pulse must be frequently taken and pupils watched."

Isn't it a pretty picture? Your wife can cut this piece out and, next time she attends a bridge party and talks about her operation, she can say, "Really, my dear, it was wonderful. And how I looked when I was under. Just listen to this—babble, babble, babble! I do so like that bit about my cheeks being puffed out when I breathed—te-he-he."

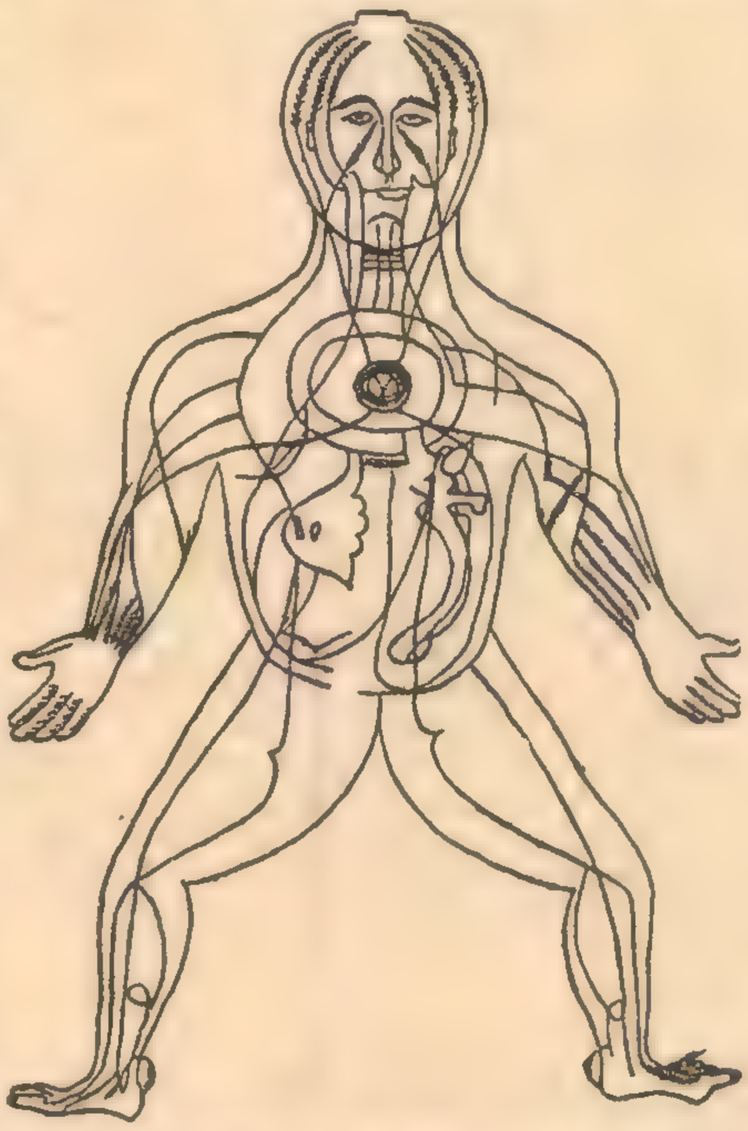
CARE NECESSARY

Whilst chloroform is the most pleasant anaesthetic, its administration must be closely watched. Unfortunately, statistics of deaths occurring during anaesthesia show that chloroform is the most dangerous of the commonly used anaesthetics.

Sometimes a mixture of ether and chloroform or chloroform and oxygen is used in order to modify the after-effects or combine the advantages of both anaesthetics.



An early drawing of the human skeleton, and, below, a representation of the nervous system. Particularly in the case of the skeleton, there could have been no shortage of "models," yet there is little suggestion of a real attempt to achieve accuracy of detail. Ailments were often attributed to supernatural influences and little note taken of purely physical effects.



Human dissection was not practised during the middle ages. Conceptions of the anatomy were based on repeated statements of old authorities as Galen, who relied more on animal than human dissection.

The next commonly used liquid is ethyl-chloride. This is used mainly in minor operations and can either be used as a general anaesthetic for producing unconsciousness by application by the usual mask method, or as a local anaesthetic by the freezing method.

Ethyl-chloride boils at a temperature of 50 degrees. It is usually kept in glass containers with a valve like a soda-syphon valve.

When sprayed from the tube on to the required part of the body the almost instantaneous evaporation produces intense cold with freezing and all sense of pain is lost.

TISSUES CHILLED

Thus minor operations can be readily performed whilst the part is frozen.

Ethyl-chloride is pleasant to inhale, is readily taken by children, and has no after-effects. It requires no special apparatus and is probably the safest anaesthetic of any within the limits in which it can be used.

Anaesthesia with ethyl-chloride is very rapid, but it cannot be prolonged with safety. Hence its use only in short operations. It is often used as a preliminary anaesthetic before the administration of ether or chloroform in long operations, especially on children.

Nitrous oxide is that notorious gas which is reputed to produce as its after-effect a high degree of hilarity—hence its common name laughing gas.

This gas was used commonly in dentistry, as the anaesthesia produced by it does not last long.

It is administered under pressure through a bag applicator and acts in two ways: It enters rapidly into the blood stream and produces partial asphyxia and progressively paralyses the nerve centres, thus acting as a general anaesthetic.

Nitrous oxide is usually administered with oxygen, as its application alone may cause a sudden rise of blood pressure which can be dangerous.

EFFECT OBSCURE

Why the inhalation of the vapors of the substances I have mentioned causes unconsciousness is something about which very little is known. Obviously the nerve centres of the brain must become paralysed, but why is largely a matter of conjecture.

Analysis of the blood and nerve fibres shows certain infiltration of protein substances, but nothing further has been discovered to solve the problem.

We now come to the local anaesthetics. The best known of these is cocaine.

Cocaine comes from the leaves of a plant from which the alkaloids of its salts are extracted.

Cocaine is a powerful local anaesthetic, the simple application of it to mucous membranes being sufficient to render the membrane insensitive.

Its action when injected, like all local

(Continued on Next Page)

DROWN YOUR SORROWS IN VITROUS OXIDE

A GRAND EXHIBITION of the effects produced by inhaling NITROUS OXIDE, EXHILARATING or LAUGHING GAS! will be given at UNION HALL, THIS (Tuesday) EVENING, Dec. 10th, 1844.

FORTY GALLONS OF GAS will be prepared and administered to all in the audience who desire to inhale it.

TWELVE YOUNG MEN have volunteered to inhale the Gas, to commence the entertainment.

EIGHT STRONG MEN are engaged to occupy the front seats, to protect those under the influence of the Gas from injuring themselves or others. This course is adopted that no apprehension of danger may be entertained. Probably no one will attempt to fight.

THE EFFECT of the GAS is to make those who inhale it either Laugh, Sing, Dance, Speak or Fight, &c., &c., according to the leading trait of their character. They seem to retain consciousness enough to not say or do that which they would have occasion to regret.

N.B.—The Gas will be administered only to gentlemen of the finest respectability. The object is to make the entertainment in every respect a genteel affair.

MR. COLTON, who offers this entertainment, gave two of the same character last spring, in the Broadway Tabernacle, New York, which were attended by over four thousand ladies and gentlemen, a full account of which may be found in the New Mirror of April 6, by N. P. Willis. Being on a visit to Hartford, he offers this entertainment at the earnest solicitation of friends. It is his wish and intention to deserve and receive the patronage of the first class. He believes he can make them laugh more than they have for six months previous. The entertainment is scientific to those who make it scientific.

Those who inhale the Gas once, are always anxious to inhale it the second time. There is not an exception to this rule.

No language can describe the delightful sensation produced. Robert Southey, (poet) once said that "the atmosphere of the highest of all possible heavens must be composed of this Gas."

For a full account of the effect produced upon some of the most distinguished men of Europe, see Hooper's Medical Dictionary, under the head of Nitrogen.

MR. COLTON will be the first to inhale the Gas.

The history and properties of the Gas will be explained at the commencement of the entertainment.

The entertainment will close with a few of the most surprising CHEMICAL EXPERIMENTS.

MR. COLTON will give a private entertainment to those ladies who desire to inhale the Gas, TUESDAY, between 12 and 1 o'clock, FREE. None but the ladies will be admitted. This is intended for those who desire to inhale the Gas although others will be admitted.

Entertainment to commence at 7 o'clock. Tickets 25 cents—for sale at the principal bookstores and at the door.

Nitrous oxide, now used as a general anaesthetic for certain purposes, was first presented to the public as the basis of an entertainment—a gas to make people laugh and forget their troubles. Above is a copy of Colton's announcement in the Hartford Courant, December 10, 1844. During one such demonstration the properties of the gas as an anaesthetic were accidentally discovered.

anaesthetics, is the complete blocking of the nerve fibre by paralysis so that pain impulses cannot be sent back to the brain.

Cocaine is certain in its action, and all of us who have had teeth extracted can testify as to its effectiveness. It produces anaesthesia in from five to twenty minutes, and it lasts about twenty minutes.

ADRENALIN ADDED

Sometimes adrenalin is added to the anaesthetic to prevent excessive bleeding.

There have been many substitutes for cocaine, some manufactured synthetically, but it is agreed that none is as effective in all its ways as cocaine.

There is a substance called scopolamine-morphine. This is the stuff used in the twilight sleep method for child-birth.

Its action depends on the fact that, when injected hypodermically, it causes temporary loss of memory. One injection of morphine is given, followed by an injection of scopolamine. At the end of one hour another dose of scopolamine is given, then at hourly intervals, depending on the patient's condition.

The patients pass into a sleep, and child-birth takes place. Upon recovery the mother remembers nothing. It is claimed that there is a remarkable absence of shock to the patient.

SPINAL INJECTION

Another interesting method of producing anaesthesia is that called spine anaesthesia.

This is brought about by the injection of substances such as procaine hydrochloride into the spinal fluid.

In this method complete anaesthesia of the lower limbs can be produced or of part of the trunk. The action is brought about by the action of the anaesthetic on the posterior roots of the spinal cord.

Major operations can be performed by this method while the patient is quite conscious. It has its dangers. For instance, great care has to be exercised to see that none of the anaesthetic reaches the brain through the spinal fluid. If this should happen one must write finis to the episode.

Paraldehyde is a chemical which when introduced into the blood produces anaesthesia without loss of consciousness. It has a reputation for being rather tricky, bordering on the dangerous. Nevertheless, it has been used with a great amount of success in various cases which could not tolerate the effects of anaesthetics producing unconsciousness.

Of course, I don't know whether it would be interesting or not to be operated on while watching the procedure. Certainly, one could keep an eye on the doctor and remind him when he shows a tendency to sew you up again with a pair of pliers or a saw still on the inside.

But I think I would prefer the sweet dreams, if any, induced by ether or chloroform.

USE OF ICE CUBES

One of the most interesting of the modern methods of anaesthesia and one quite unique in its simplicity is that of chilling the tissues with ice cubes.

This has been developed in New York City Hospital by several doctors. The method consists in packing the arm or leg in ice cubes and iced water and chilling it down to 40 degrees, or just a little above freezing-point.

It is unique in its action in that it acts on the protoplasm of the body cells and makes them insensitive to pain. The result is that the nerves do not come into action at all in this instance; there is no pain, in the first place, so the nerves have no impulses to transmit to the brain.

Other local anaesthetics, as explained before, act by blocking the passage of nerve impulses to the brain. Systems like nerve-blocking used in dentistry find a nerve centre and put it temporarily out of action, so that all nerve fibres emanating from that nerve centre are useless for the time being. Thus, an injection into the nerve centre at the angle of the jaw enables the dentist to extract all the teeth with the one simple injection.

SHOCK MINIMISED

If the protoplasm is put out of action the pain impulses just don't exist at all. With the freezing method the patient may exist as usual. He can eat anything he likes. After having his leg chilled, he can have an argument with the surgeon while having his leg chopped off or otherwise cut about.

Another virtue of this method is that, owing to the cold, bacteria that may otherwise cause complications, by bringing about sepsis, are put out of action.

There is no shock, no pain, and very little risk of infection. The implications of this are far-reaching, especially in wartime. It would be possible to chill the limb of a wounded soldier and transport him over great distances for attention.

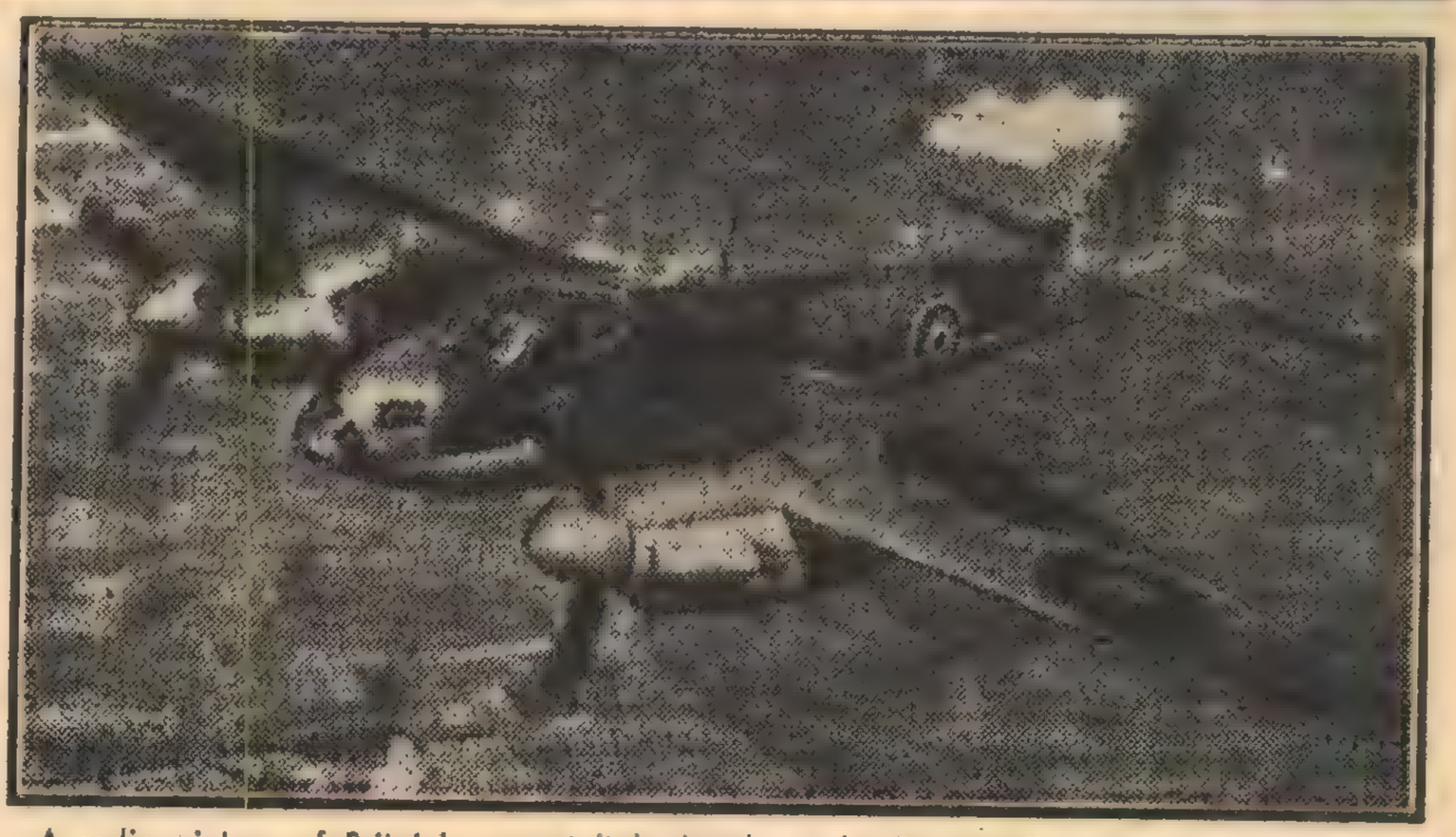
Operations on old people, always attended by great hazards when using general anaesthetics, have been successfully performed with a reduction in the death-rate from shock and other after-effects from 80 per cent. to 20 per cent.

Owing to the body cells being put out of action by chilling, it follows that it is possible to apply a tourniquet to a limb and leave it on for long periods.

Such is progress!

PLYWOOD PLANES IN THE FIGHTING LINE

In addition to the serious problem of supply, the use of aluminium and its alloys in aircraft construction involves certain structural difficulties. It necessitates the use of thousands of rivets, each one requiring individual attention and each adding its quota to the surface drag of the plane. At high speeds, sections of the metal skin tend to flap slightly, further adding to the inefficiency of the surface. New plywoods promise a partial solution to all these difficulties.



A radio picture of Britain's newest light bomber—the De Havilland Mosquito. Developed from the famous Comet racer, this new plane is of simple wooden construction and ideally suited to mass production on a large scale. Manoeuvrable and possessing a high turn of speed, the Mosquito promises to be one of the outstanding operational planes of the war. Span is 54ft., length 41ft. and armament probably four cannon and four machine-guns.

THE new plywoods are far removed from the old varieties. They are impregnated and bonded by special plastics. They are resistant to all normal atmospheric conditions. They are tough and may be polished to a glassy surface without ripple or break. But we must start at the beginning.

An eggshell needs no struts. In its construction it takes full advantage of the inherent strength of an arch throughout its whole surface. Consequently it is hard to break, even though it is composed of crumbly carbonate of lime.

The nose of an Avro-Anson bomber is not unlike half an egg in appearance and, like an eggshell, it gets along very well without struts and complicated cross-braces. There the likeness ends, however, for the material that goes into the bomber nose is strong, with an amazingly high strength-weight ratio. That material, strangely enough, is wood.

THE STORY OF PLYWOOD

How, it may well be asked, can wood be so shaped as to resemble an egg and how, with relatively less thickness than the shell of a hen's egg, can it attain strength to make it an alternative for high tensile steel and duralumin as an aircraft material? The answer is to be found in the application of modern methods and materials to an ancient art—the art of bonding together thin sheets of wood to make plywood.

Plywood was known as far back as four thousand years ago, and an Egyptian plywood casket of approximately that age now rests in the New York Metropolitan Museum of Art. In ancient times it was valued chiefly for its decorative qualities, and Cicero is reported by Pliny to have paid a million sesterces —twenty thousand dollars—for a veneered citrus-wood table.

Apart from its beauty, however, veneer, the name by which plywood has been more commonly known, was usually considered a poor rival of "solid" lumber, of which most countries had a plentiful supply, and the word veneer came to be synonymous with superficiality and deceitfulness.

The advantages as well as the weaknesses of plywood for aeroplane construction were clearly demonstrated during the last war, when the infant aircraft industry began to clamor for light, strong, easily worked material. Plywood was chosen at that time because it was the strongest known material, weight for weight.

It was easy to cut, curve and form; was inexpensive; could be obtained in quantity and had unusual dimensional stability. A machine was invented that could peel a single ply in a continuous sheet from a rotating log as if it were unwinding a large roll of paper, and thus plywood could be made in sheets of any desired size.

In its structure plywood takes advantage of the natural strength of solid lumber and eliminates many of its weaknesses. Wood is notoriously easy to split along the grain—just try splitting it the other way!

It also swells across the grain when it absorbs moisture. Plywood is built up with the grain in each layer at right angles to the grain in the next. This causes each layer to resist the tendency of the adjacent layers to split or swell.

But there was a nigger in the plywood pile. Like the proverbial chain, plywood could be no stronger than its weakest link, which was, in this case, the bonding substance that held the plies together.

GLUES WERE POOR

Old-style glues often failed to hold. They would weaken with age and had little resistance to heat or moisture. Buckling and splintering plywood was bad enough in the old-fashioned plywood chair seats of unhappy memory—imagine an aeroplane built of the same stuff!

Improved glues were developed which overcame some of the weaknesses of the old, but these, too, had poor resistance to continuous soaking and no one could tell how quickly old age would cause them to lose their grip.

An additional handicap was the susceptibility of these glues to bacteria. Made from such things as tapioca, milk curds and packing-house waste, they proved quite a feast to hungry micro-organisms and there are accounts of Fokker planes used during the last war which even grew mushrooms inside their wings.

It was quite natural, therefore, that after the last war plywood for aircraft should be replaced by metal. As time went on, the construction of aircraft became an enormously complicated task and the use of aluminium was discov-

(Continued on Next Page)

From An Article By

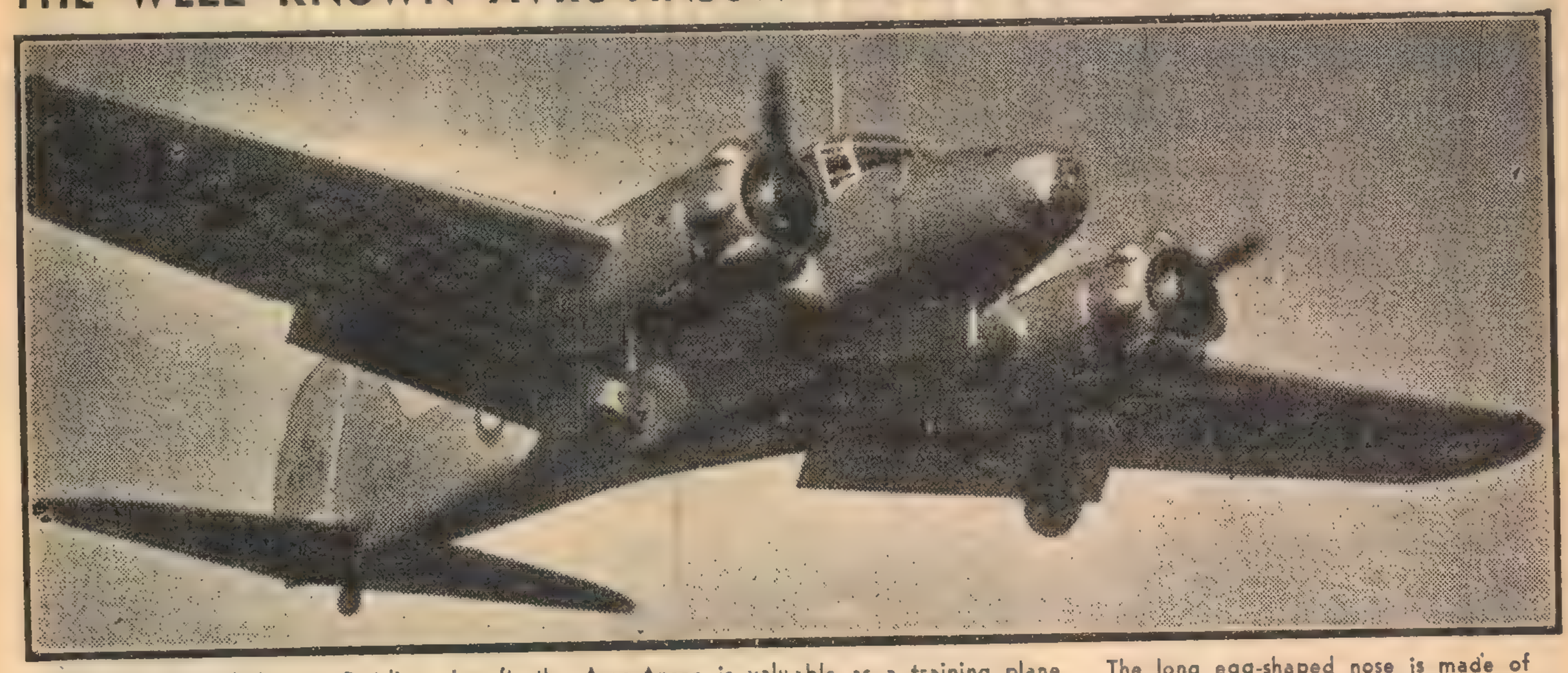
JOHN HARWOOD-JONES

In

"Science And Discovery"

AVIATION

THE WELL KNOWN AVRO-ANSON BOMBER HAS A PLYWOOD NOSE



Although outmoded as a first-line aircraft, the Avro-Anson is valuable as a training plane. The long egg-shaped nose is made of wood. The structure is devoid of struts or complicated cross-braces but is amazingly strong for all that, due partly to the nature of the material and partly to the arched shape.

(Continued from Previous Page)

ered to have its drawbacks. Some 450,000 rivets have to be fastened, one at a time, in an ordinary-sized aluminium bombing plane.

To do this job, swarms of men, like bees that are too big for their cells, crawl in and out of the plane framework and squeeze into the wings as they fasten the aluminium sheets to the frame. Often the design of a plane has to be deliberately complicated so that a man can reach a rivet inside the wing or tail, and one United States aircraft company is reported to have hired a midget to do riveting where a man of ordinary size could not reach.

MANY ADVANTAGES

Rivet heads on the surface of the plane mar the desired streamlining effect. A shortage of vital aircraft metals did not loom until this war, but it can no longer be disregarded.

The revival of interest in plywood for aircraft dates from the early 'thirties, when resin adhesives of the plastics industry attracted the plywood manufacturers. Experiments with these adhesives over a period of years showed that they were highly resistant to water and heat, were so strong that no instruments could measure their strength and were about as nourishing to microbes as plate glass.

By now the so-called "plastic" plane, which really should be called a plastic-bonded plywood plane, has so caught the public imagination that scarcely a day goes by without some mention of it in the Press.

LITTLE DATA AVAILABLE

Experts take pains, however, to point out that plywood planes are not going to replace metal planes overnight. In the first place the aircraft industry is "metal minded."

Secondly, there is little scientific data on the use of plywood in aircraft and about the only way to determine the airworthiness of a plywood plane is the "try-to-break" process, which means testing a plane to destruction.

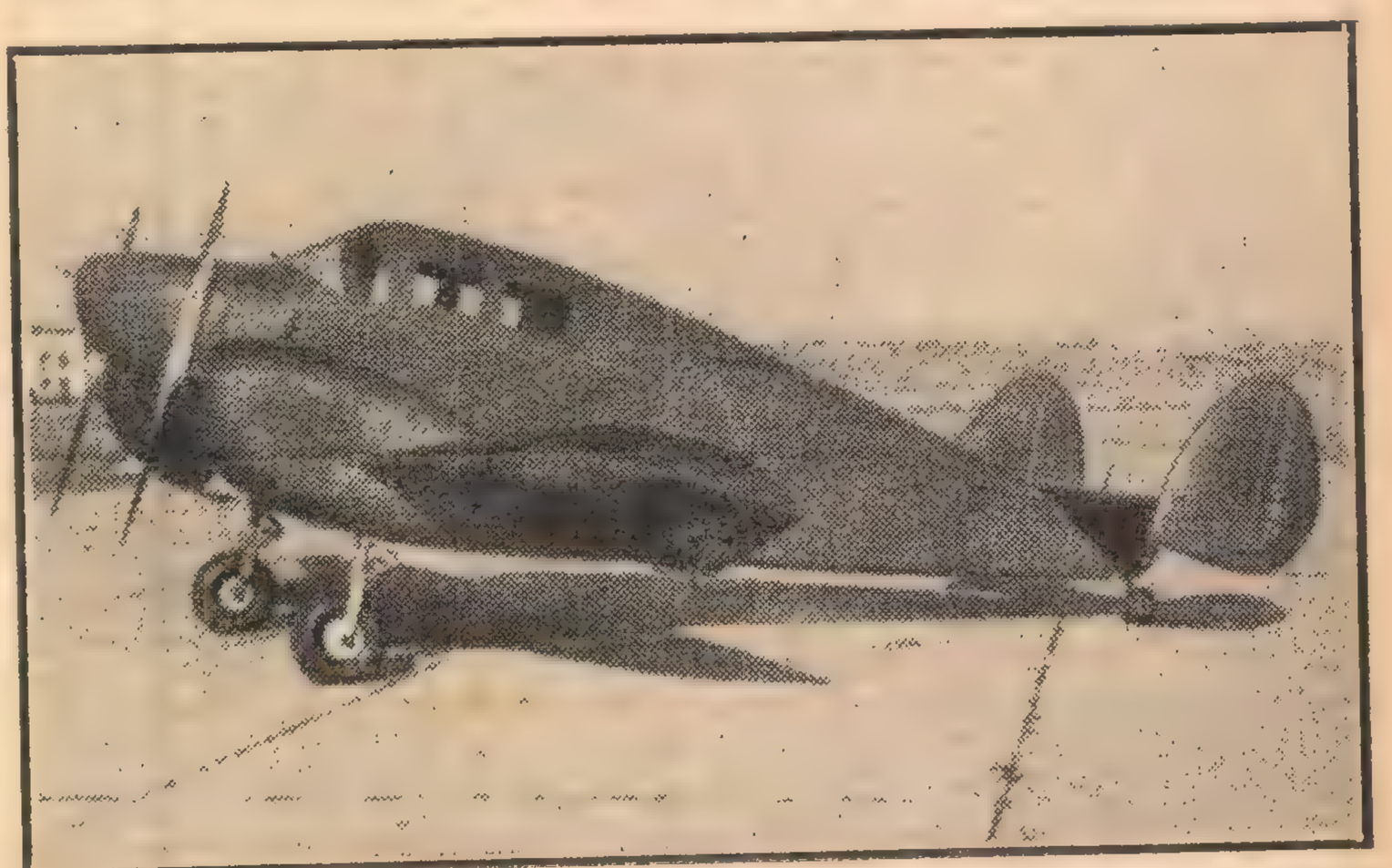
Finally, in the rush of war business there has been little time for any large-scale experiments for the replacement of metal by plywood, and the development of the plywood plane has so far been a venture of the smaller companies.

Nevertheless, plywood in aircraft is staging a comeback in spite of, and in some respects because of, the war. Large aviation companies are so swamped with orders that they are subcontracting as much as possible, and since metal-working shops are all running at capacity, the wood-working industry, which has had so far a relatively small part in our war effort, has been recruited into the ranks of military aviation.

Plywood parts, such as leading wing edges, tail sub-assemblies, bomb-bay doors and engine coverings, are being used more and more. Methods have recently been devised which allow the forming of plywood fuselages and wings on a mass production basis. Washington announced recently that the US has ordered a fleet of 14 gliders, including four big transports, made of plastic-bonded plywood.

RECENT DEVELOPMENTS

Two examples of successful types of planes completely fabricated with plywood are the Timm Aeromold Trainer and more recently the Morrow Trainer in the USA. Hints are given even of secret twin-engine fighters to be manufactured in Canada, with sufficient range to cross the Atlantic and enough speed to hold their own in any combat,



A small cabin monoplane made from thin layers of mahogany bonded with a special plastic. The plane is devoid of rivets or other mechanical fastenings, and the exterior is smooth and glossy. US aircraft manufacturers have plans to mass produce large cargo-carrying planes along the same lines.

entirely made of plastic-bonded plywood with the exception of a few necessarily metal fittings.

Experiments in plywood for aircraft centre mainly around evolving manufacturing methods by which can be attained a high rate of production together with the ultimate in strengh in the finished product. A glance at the problems met with in the manufacture of the Anson bomber nose, a relatively simple product, is not without interest.

At first sight, the method adopted seems to combine features of fedora hat and cup cake making, the main equipment, outside of wood-working tools, being two wooden moulds on which the right and left halves of the bomber nose are built up and a giant "cooker," where heat and pressure, applied simultaneously by a patented method called the Vidal process, set the glue and give the nose its permanent shape.

The main materials used are aircraft spruce, cut in almost paper-thin plies, and "Plaskon" resin glue, supplied by the Plastics Division of CIL.

CONSTRUCTION

The problem is to get compound curvature, to build up an egg, as it were, from straight, flat strips of shell. It isn't as simple as taking wide plies, the size of the finished product, and pressing them into shape, for, if the plies (each 1-28th to 1-45th of an inch thick) were strained too much, they would split.

The plies are cut in thin strips in the direction of the grain. The size or number of the strips does not affect the strength of the finished product because the bond that holds them together is stronger than the wood itself. Where the curve is sharp and the danger of splitting great, small strips are used.

Built into the mould are grooves in which are placed the plywood attachments which are glued to the inside of the shell in the same operation. When glue has been applied to these parts, the strips of wood are laid around the mould with the grain running at an angle of 30 to 45 degrees to the axis of curvature.

The first layer is temporarily stapled to the mould. After a layer of "Plaskon" glue has been applied, the second layer of strips is laid with the grain running at right angles to the grain in the first layer. Staples again are used, those in the first layer being removed as each new strip is put in place. This process is continued until the desired number of layers is built up.

"DONE TO A TURN"

The mould is then put into a rubber bag, from which all the air is exhausted, forming a vacuum. It is then put into a cooker, where heat is applied and air pressure increased until there is a tremendous even pressure on all parts of the built-up plywood shell. It is then that the "Plaskon" resin glue begins to perform its miracle.

Microscopic, hook-shaped fingers of the glue are extended between the wood fibres. The glue then undergoes a chemical reaction, converting into an insoluble, infusible plastic material, gripping the pieces of wood with an almost indestructible hold. When this chemical reaction is complete, the shell is "done to a turn."

It is then taken out, staples are removed and it is joined to the other half by cold press "Plaskon" adhesive treatment. A plywood flooring is glued in, openings are cut out for the plastic windows, aircraft dope and paint are applied and the bomber nose is ready for shipment to an aircraft assembly plant.

Since the plywood plane emerges from the oven innocent of rivet heads, it is claimed that 25 per cent. less driving power is required than for an aluminium plane, and where a conventional plane driven by a 75-horse-power motor develops a speed of 105 miles an hour, a plywood plane of the same size and driven by the same motor develops a speed of 140 miles an hour.

But the beautiful streamline finish of the plywood plane is not its only or greatest advantage. As stated earlier, a possible shortage of vital aircraft metals cannot be ignored and plywood is playing an increasing part in replacing metals in first-line planes as well as in trainers.

Along with the shortage of metals comes the perhaps more serious shortage of skilled metal workers. Here again plywood comes to the rescue by bringing wood workers into the aircraft industry and by giving to idle pianos or furniture factories an important role to play in the gigantic war drama that is unfolding.

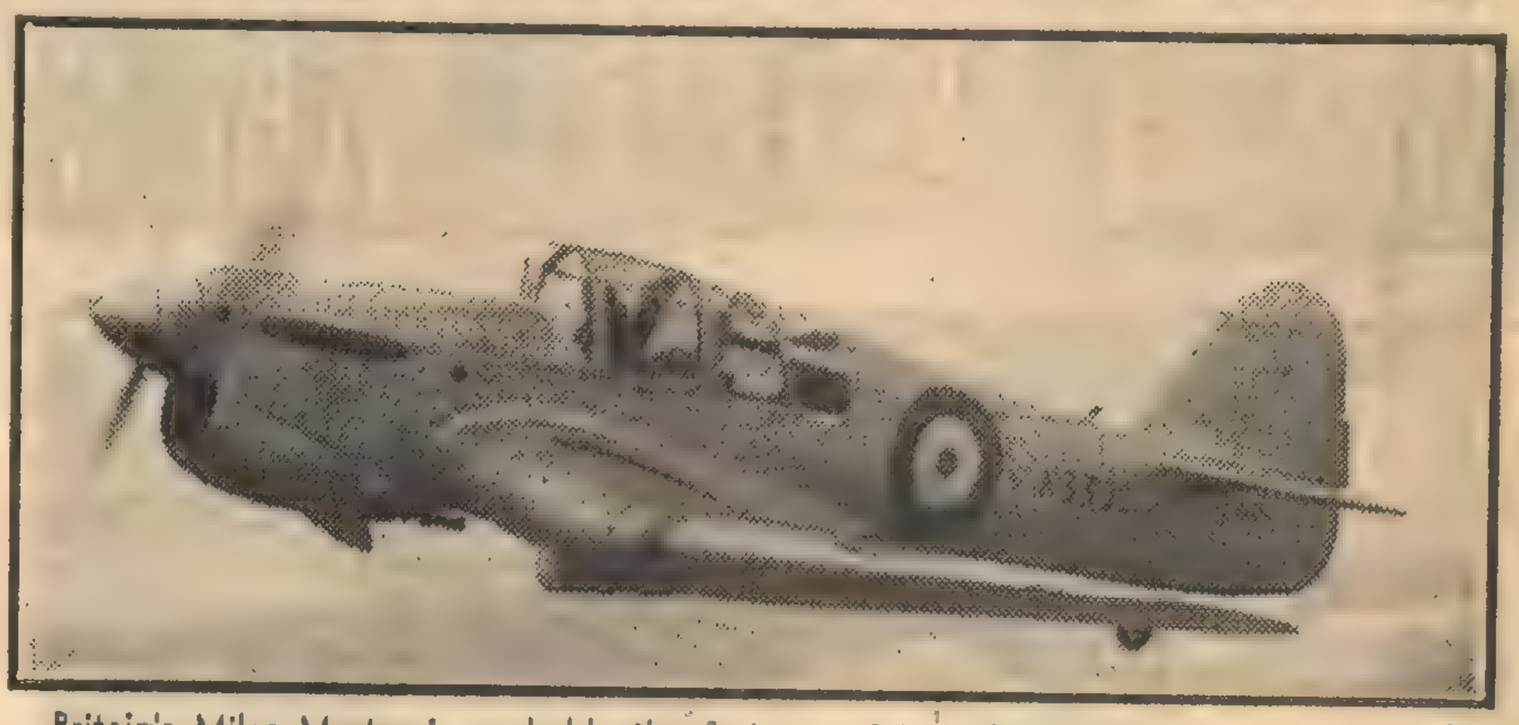
Plastic-bonded plywood has many other fields of application beside aircraft construction. The fact that it can be totally immersed in water for years with no weakening of the glue line has made possible the construction of plywood craft ranging from sailing dinghies to some of the smaller modern, fast Canadian naval vessels now plying east and west American coastal waters.

ENDLESS POSSIBILITIES

Proof also against heat, oil, gasoline and common solvents, it can be used for such diverse items as automobile body parts, prefabricated houses, pianos, doors, beer-barrel staves, radio cabinets, hockey sticks, skis, rafts and buoys, furniture, target pontoons, sewing machine cabinets and luggage.

In short, plastic-bonded plywood means big business for the lumber industry and heralds a new era in the aircraft industry, far removed from the time man first "made iron to fly."

THE MILES MASTER ADVANCED TRAINER



Britain's Miles Master is probably the fastest training plane in the world. Designed along the lines of a modern fighter and equipped with a Rolls-Royce Kestrel motor, it has a top speed of about 270 mph. The Miles Master is largely of wooden construction.

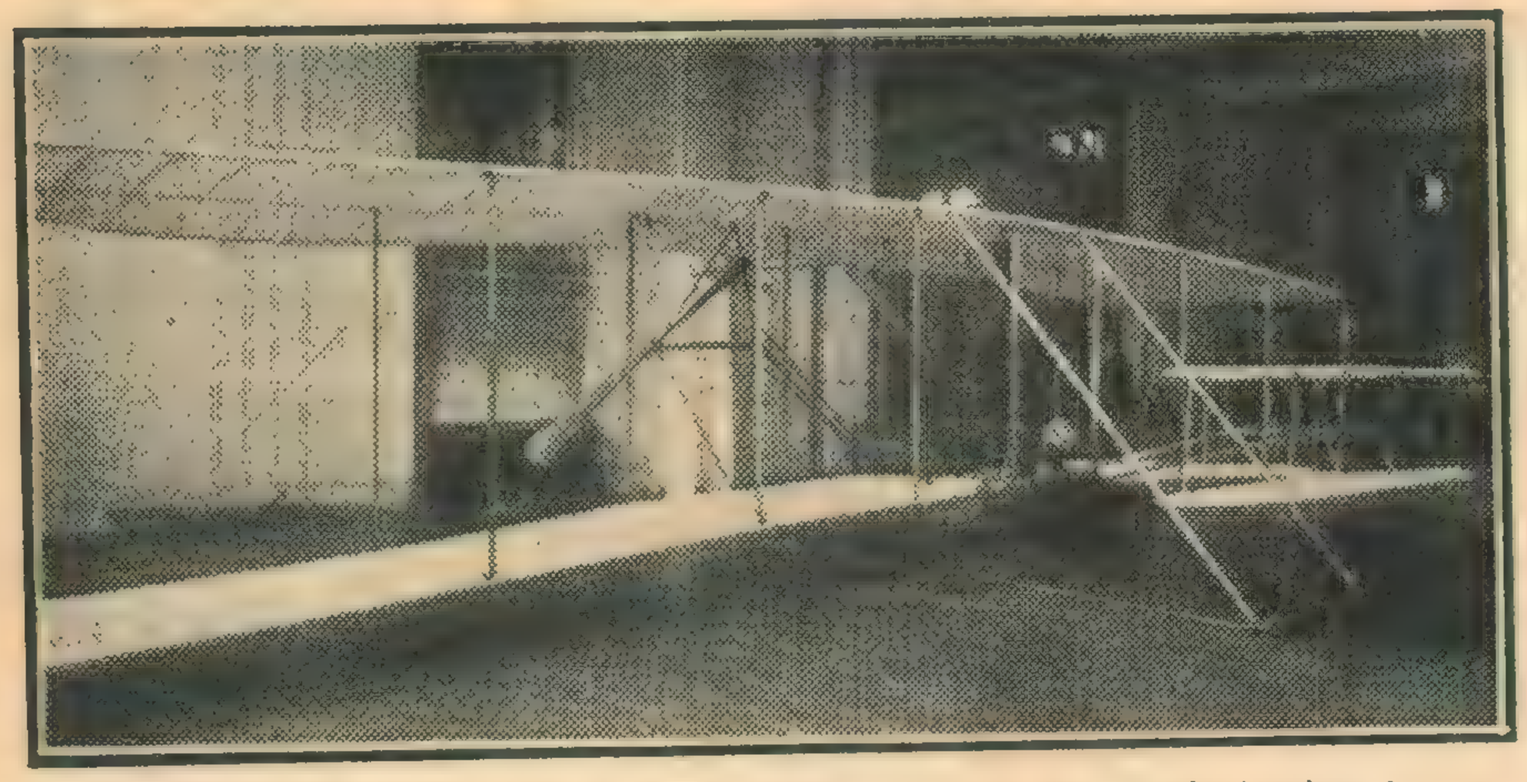
A TRIUMPH FOR "GEORGE"

"George," the automatic pilot, brought off a 100 to 1 chance by landing an empty aeroplane successfully after the crew had bailed out. The crew of the aircraft had done a good job of work and were making for home in darkness and foul weather. Everything that could have given them guidance was hidden in mist. The wireless was faulty. They became lost. To attempt a landing would have meant almost certain disaster.

Petrol was running short, and while the last drops remained in the tanks, the pilot set "George" to take the aircraft in the direction of the sea so that it would not fall on a town. Then he and the crew bailed out over land. The aircraft was heard by the Observer Corps, which told the aerodrome, which was nearer than the pilot had supposed.

Soon the aerodrome staff heard it approaching. They sent off rockets and flares, but, to their consternation, the aircraft paid no attention and passed on towards the coast. Later, someone 'phoned up in great excitement to say that the aircraft had made an almost perfect landing on the beach—empty!

WRIGHT BROTHERS WERE CALLED CRANKS



The first successful heavier-than-air flying machine built by the Wright brothers is now a museum piece. The plane flew tail first, the pilot lying prone on the wing alongside the motor.. Flight control was achieved by tilting the "tail" plane and by warping the whole of the wing surface by means of guy wires. The plane had two pusher propellers driven by long chains from the motor.

In December, 1903, Wilbur and Orville Wright made history at Kitty Hawk, N.C., for there they achieved the distinction of being the first men to fly in a heavier-than-air machine. But when they returned to their home in Dayton, Ohio, there was no brass band to welcome them, no reception committee. The townsfolk, in common with most other people who had heard of the affair, simply would not believe that they had accomplished the "impossible."

THEIR neighbors thought that, if the thing had been done at all, it must have been an accident due to unusually powerful winds —just a stunt not likely to happen again. When acquaintances met the inventors, they made no reference to the reported flight because it was embarrassing to discuss anything so preposterous!

Not a word about the feat of December 17 appeared in the "Dayton Journal" next morning. Six or seven papers in the country carried a fantastic story, but nearly everyone in the United States disbelieved the reports about flying with a machine heavier than air.

COULDN'T BE DONE

Had not leading scientists—among them Simon Newcomb, famous astronomer and mathematician—already explained with unassailable logic that the thing was impossible? Naturally no editor who knew a thing couldn't be done would permit his paper to record the fact that it had been done by two obscure bicycle repairmen who hadn't even been to college.

In April, 1904, the Wrights began to carry on practice flights in a cow pasture on a farm near their Dayton home. Though these experiments were the big scientific news of the century, scarcely anything was ever said about them by those in Dayton. This was not because the Wrights were secretive. They could hardly have kept secret what they were doing in that open field, for there was an inter-urban car line and a public highway on one side of it and a railroad on another.

Said genial Dan Kumler, who was city editor of James M. Cox's "Daily News" in Dayton during those days:—

"People who passed the pasture on inter-urban cars used to come to our office to inquire why there was nothing in the paper about the flights. Such

callers got to be a nuisance. We just didn't believe it."

One fact that kept the flights relatively inconspicuous was that much of the time they were within 10 or 15 feet of the ground. At first, the inventors made only short hops, as at Kitty Hawk. They spent most of 1904 and 1905 learning to steer the plane, to make circular flights and to achieve distance. In October, 1905, Orville flew about 20 miles, and two days later Wilbur flew 24.2 miles.

Yet the miracle of flight still failed to attract much attention. One day several rural school children told Luther Beard, then managing editor of the "Dayton Journal," that they had seen the Wrights fly around the pasture for fully five minutes. Beard, meeting Orville Wright on the inter-urban that afternoon, asked if it were true. Oh yes, Orville admitted, they often did that.

Evidently, then, the story didn't amount to anything after all—Orville himself didn't seem to think it was unusual or important. The Wrights' circling a pasture was pretty good for two local boys, but hardly a thing to take up space in the paper. However, Beard said to Orville, "Well, if you ever do something unusual be sure to let us know."

CRANK INVENTORS

Though hundreds of people by now had actually seen the Wrights in the air, the vast majority throughout the country, including even scientists and editors, simply didn't believe a heavier-than-air flying-machine had ever left the ground by its own power.

Still another group of people, who might have been expected to be curious about the subject, were more annoyed than interested. These were the United States War Department officials.

The Wrights patriotically wished to offer their Government a world monopoly on their patents. They thought that the aeroplane might be useful for scouting in war. This belief was supported when foreign governments, especially the French, began flirtations with them. Accordingly they wrote to the Secretary of War, giving the US first opportunity to control all rights in their invention.

The War Department evidently regarded the letter simply as something for their "crank file." A reply, sounding like a form letter, was signed by a major-general of the General Staff. It said that the "Board of Ordnance found it necessary to decline to make allotments for the experimental developments of devices for mechanical flight." (At no time had the Wrights even remotely implied that they sought any allotment.)

PROOF REQUIRED

Another letter received late in 1905 from the Ordnance Department said that the Board did not care to take any action "until a machine is produced which by actual operation is shown to be able to produce horizontal flight and to carry an operator." (The Wrights had been flying such a machine since December, 1903.)

A member of the Cabot family in Massachusetts, seeing a little item to the effect that the Wrights were dickering

FEW WOULD BELIEVE THEY HAD FLOWN

with France for the use of their new-fangled "airship," wrote them inquiring why they did not offer the invention to their own country. The Wrights replied that they had repeatedly tried to. The correspondence came to the attention of Senator Henry Cabot Lodge, who forwarded it to the Secretary of War, who shoved it along to the Ordnance Board—who did nothing about it.

In 1907 someone sent to President Roosevelt a clipping about the Wrights. Roosevelt marked the clipping, "Investigate," and passed it along to Secretary of War Taft. Taft added his own "Investigate" on a memorandum slip and sent it to the Ordnance Board.

ORDNANCE SCEPTICAL

The Board's personnel had partly changed since the correspondence with the Wrights in 1905, but they had the same scepticism. Though they made a half-hearted "investigation," consisting of a letter or two, they made it plain to the Wrights that the War Department was too shrewd to be taken in.

Finally, nearly four years after the flight at Kitty Hawk, the War Department began to show a different attitude as news about the interest of European governments in the aeroplane reached them from their military attaches. A deal was made which provided for the purchase of a Wright plane for 25,000 dollars if it demonstrated that it could carry for one hour a passenger besides the pilot; if it had a speed of 40 miles an hour and carried enough fuel for 125 miles. It was arranged that a demonstration should be made at Fort Myer, Virginia, in September, 1908.

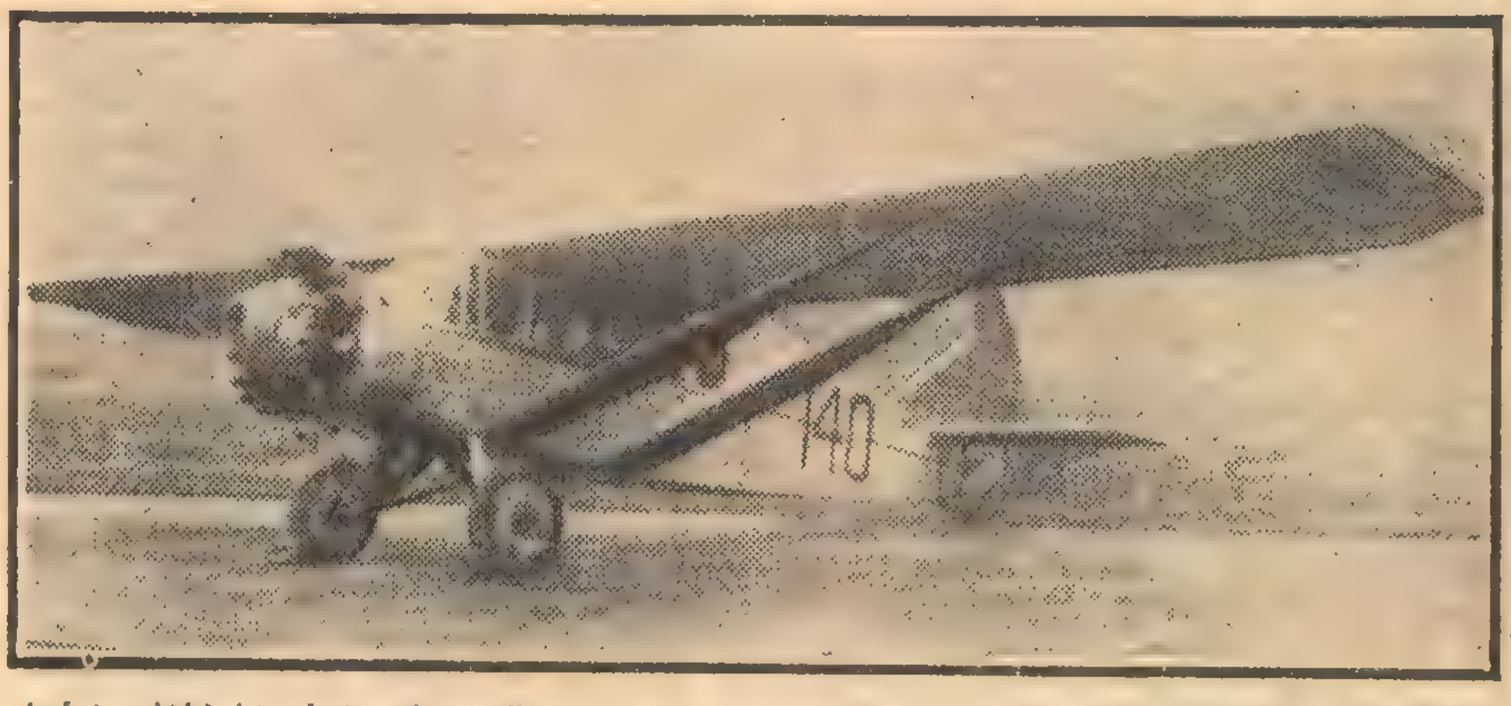
During early experiments the Wrights had continued to ride "belly-buster." Someone had described a Wright flight as resembling a man lying on his stomach looking out of the front of a chicken coop.

PAPERS INVESTIGATE

For their trials of a new steering apparatus, the Wrights returned to their old cabin at Kitty Hawk. One day in May, 1908, the Wright machine was seen in the air by D. B. Salley, a Norfolk (Va.) reporter, who was at Kitty Hawk by chance. He telegraphed a number of large newspapers asking if they wanted the story.

The telegraph editor of the "Cleveland Leader" not only wasn't interested, but was indignant at so silly an inquiry, and he wired Salley to "cut out the wildcat stuff." To editors of the "New York Herald" it sounded crazy also. Yet, because the owner of the "Herald," James Gordon Bennett, was excited about aeronautics, they decided to investigate the strange tale.

They sent their star reporter, Byron R. Newton, to Kitty Hawk. If the Wrights proved to be fakers no one could do a better job of exposing them than Newton. Meanwhile the "Herald" risked printing Salley's first despatch,

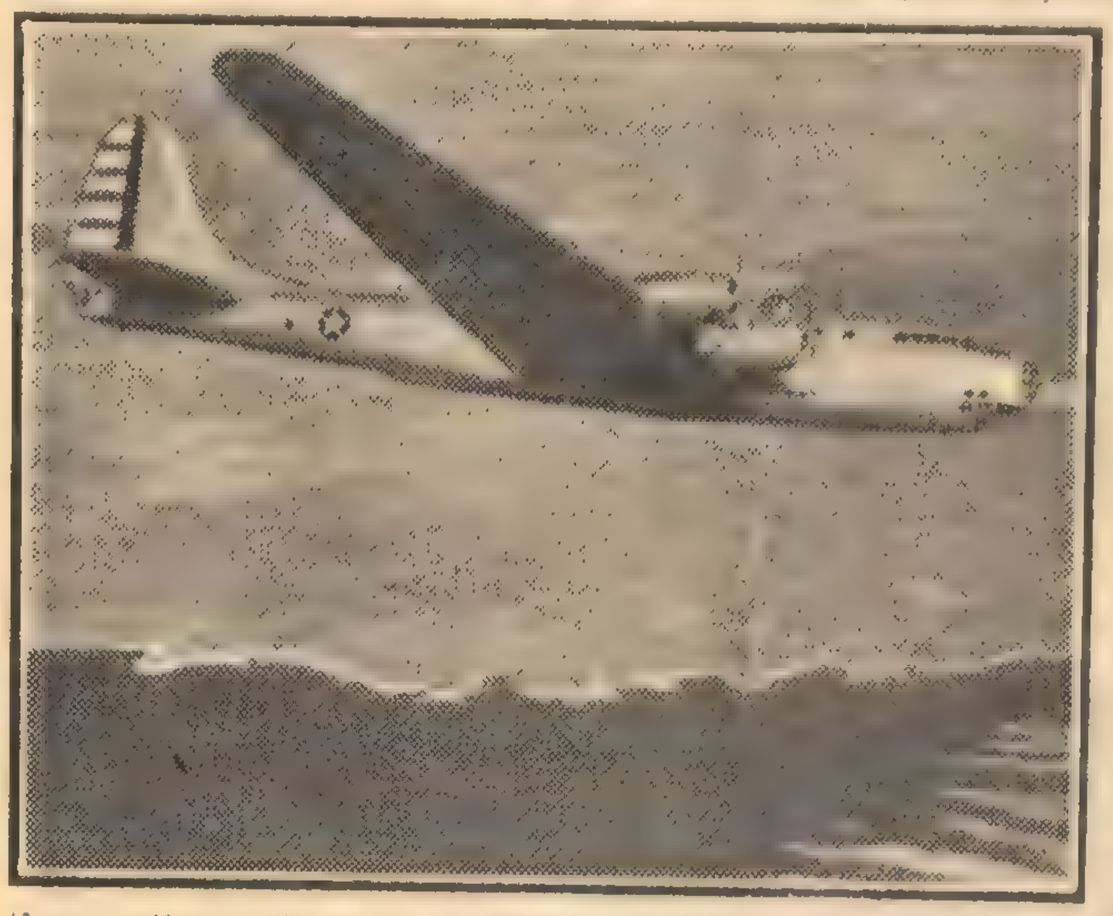


A later Wright plane, the Bellanca, of about 1930. A single generation has sufficed to see the aeroplane progress from the power-driven kite on the opposite page to the monster Douglas B-19 pictured below.

and other editors who saw it felt that the time had come to get the low-down on the Wright brothers.

So Newton was joined at Kitty Hawk by William Hoster, of the "New York American," Arthur Ruhl, of "Collier's Weekly," James H. Hare, famous news photographer, and others.

When the newspapermen noted the desolate isolation of Kitty Hawk they assumed that the Wrights wished privacy. They decided to be no less secretive than the Wrights. Provided with food and water, they hid daily in the pine woods within sight of the Wrights' base, and observed with field-glasses what happened. To their astonishment



they witnessed human flight. They even saw, on May 14, what no person on earth had ever seen before—flight with two men in the machine.

We must remember that the general public still did not believe that flying was possible, although the Wrights had already done it here at Kitty Hawk more than four years before. Now, at last, came front-page headlines announcing what the Wrights had accomplished.

Even such reports did not convince everybody, and many newspapers still did not publish the news. When Newton sent an article on what he had seen at Kitty Hawk to a magazine it was returned to him with the editor's comment: "While your manuscript has been read with much interest, it does not seem to qualify either as fact or fiction."

FORMAL DEMONSTRATION

Not until the formal public demonstrations of flying from the parade-grounds at Fort Myer in September, 1908, did widespread incredulity about the Wrights' achievement finally cease. Then, at last, everyone, editors and even scientists agreed that a practical flying-machine was a reality. But the disbelief persisted up to the last minute.

Considering that this was to be the first public demonstration of the outstanding wonder of the century, the crowd had strung about the Fort Myer parade-ground in small groups. Theodore Roosevelt, jun., remembers that he estimated it for his father's benefit at less than one thousand.

"When the plane first rose," says Roosevelt, jun., "the crowd's gasp of astonishment was not alone at the wonder of it, but because it was so unexpected. I'll never forget the impression the sound from the crowd made on me. It was a sound of complete surprise."

When Orville Wright landed after this flight it was his turn to be astonished. Three or four newspapermen rushed up to him and each of them had tears streaming down his cheeks. The drama of witnessing the impossible had "got" them.

FEATURE STORY

ITEMS OF NEWS FROM A WORLD AT WAR

Electric Machine-Gun

GERMAN armament technicians are testing a new electric machine-gun that will fire 3000 rounds a minute, says Berlin radio.

The gun has been officially called the "Scythe of Death."

It is claimed that its dense fire of bullets is comparable with the stroke of a scythe.

The Germans say the gun is weather-proof, and is easily carried.

[The Vickers and Browning machine-guns used by the British Army fire 440 and 400 rounds a minute, respectively.

The Lewis gun fires between 600 and 700 rounds a minute.]

* * *

Air Blitz On Malaria

THE RAF in the Middle East is assisting to fight malaria.

A plane has been allocated to spray danger areas in Palestine, Transjordania, Syria, Iran, and Irak with a powder which is fatal to mosquito larvae.

The under-side of the fuselage is fitted with tubes, from which the powder is blown.

Places suspected of harboring the mosquitoes are sprayed from the air each week.

NEW U-BOAT ENGINE

According to reports from various sources, it appears that the Germans have had some success with a new type of engine for U-boats. The engine burns oil fuel when surfaced, but for under-water cruising it operates on a controlled mixture of hydrogen and oxygen. Storage tanks are filled under high pressure with these gases before the U-boat leaves the home base. However, it is suggested that a means has been evolved for manufacturing the gases on board. Elimination of the electro motors and the vast banks of accumulators would make for much greater efficiency, since these items constitute as much as one-sixth of the total weight of the craft.

Sawdust Tyres

HARRY JOHNSON, a Massachusetts chauffeur, has discovered a method of making sawdust tyres by pouring oil into sawdust-filled sections of a wooden car tyre he has invented. The tyre is made up of eight sections, held together by wooden pegs. Oil is used to keep the wood moist and resilient.

New Australian Destroyer

THE Australian-built Tribal class destroyer Arunta, manned by an Australian crew, has successfully undergone her speed trials. She is the largest Australian-built naval vessel to be commissioned for 12 years.

One 11-hour test, watched by representatives of the Press, demonstrated the vessel's high turn of speed and remarkable manoeuvrability. Actual top speed was not disclosed, but the Tribal destroyers in the British Navy are officially credited with 36 knots, and Arunta's performance over a measured mile left nothing to be desired. Her Australian-built engines are giving unquestionable satisfaction.

Naval officers and dockyard engineers who supervised the tests over hundreds of miles showed undisguised pleasure at the vessel's performance.

The destroyer was commissioned before she went on trials.

The guns were ready for instant action, and while she was reeling off the knots, gun crews were at drill.

The ratings' quarters are roomy, comfortably equipped, and well ventilated. Hot water is laid on in the wash-rooms and iced drinking water is available from conveniently placed refrigerators.

* * *

A.A. Wire Barrage

SUPPLEMENTING the regular anti-aircraft guns on ships is a special form of rocket apparatus which shoots a parachute into the air, the parachute trailing long steel wires as it descends. The wires force attacking planes to swerve from their course. According to an Italian report, the chute can be thrown to 20,000 feet, and the trailing wires cover a radius of 150 feet.

* * *

Strengthening Rubber

RUBBER'S physical properties can be improved by incorporating into it a substance composed of two benzine molecules, known as diphenyl, according to a patent granted at Washington, USA, to Robert L. Sibley, of Nitro, W. Va.

Only small amounts of the diphenyl need be incorporated in the rubber, the patent asserts. Based on the rubber, only from five-tenths to three parts of the diphenyl is required to improve the resistance of the rubber and its lasting properties.

* * *

R.A.F. Fire Balloons

IT is reported that the German people have been warned against the dropping of incendiary balloons by the RAF. The balloons burst into sheets of flame several yards long on contact with the ground.

AUSTRALIA'S WARBIRDS SMASH AT ROMMEL

The ceaseless hammer blows rained by the Allied air forces on Rommel's Afrika Korps was in no little way responsible for the brilliant success of the British Eighth Army in Egypt. Picture shows a group of RAAF Kittyhawks, motors roaring, waiting for the signal which will send them hurtling over the enemy lines.

Huge German Transport Plane

BEFORE he shot down a German Blohm and Voss 222 flying boat—the largest transport aircraft in the world—an RAAF long-range fighter pilot thought it was a 3000-ton merchant vessel.

The pilot sighted the giant aircraft over the Mediterranean, apparently bound from Tripoli to Sicily.

The BV has six engines, can carry 80 fully-equipped troops and has a 150ft. wingspan—sufficient to take four Spitfires wingtip to wingtip.

The Australian soon realised that the target was no sea vessel.

"It had a good turn of speed, and I had to chase it for 20 miles before I was in a position to attack," said the pilot.

"I came from above. It was a full deflection shot and my cannon and machine-gun fire ripped into the fuselage.

"The boat burst into flames and then some petrol tanks must have burst. From 300 feet, the German aircraft steadily lost height, struck the water and then bounced 60 feet into the air.

"It then stalled, the port wing dropped and the giant plane dived into the sea, blowing up at the second impact. We saw no sign of any occupants."

* * *

New Drug Saves Life

THE use of the new drug, sulphapyridine, reduced fatalities from cerebro-spinal meningitis (spotted fever) to 33 per cent. in 1939, compared with 66 per cent. in the years 1934 to 1937.

It is estimated that the skilled use of sulphapyridine in hospitals saved 10,000 lives from spotted fever in 1939, and probably 7500 from pneumonia.

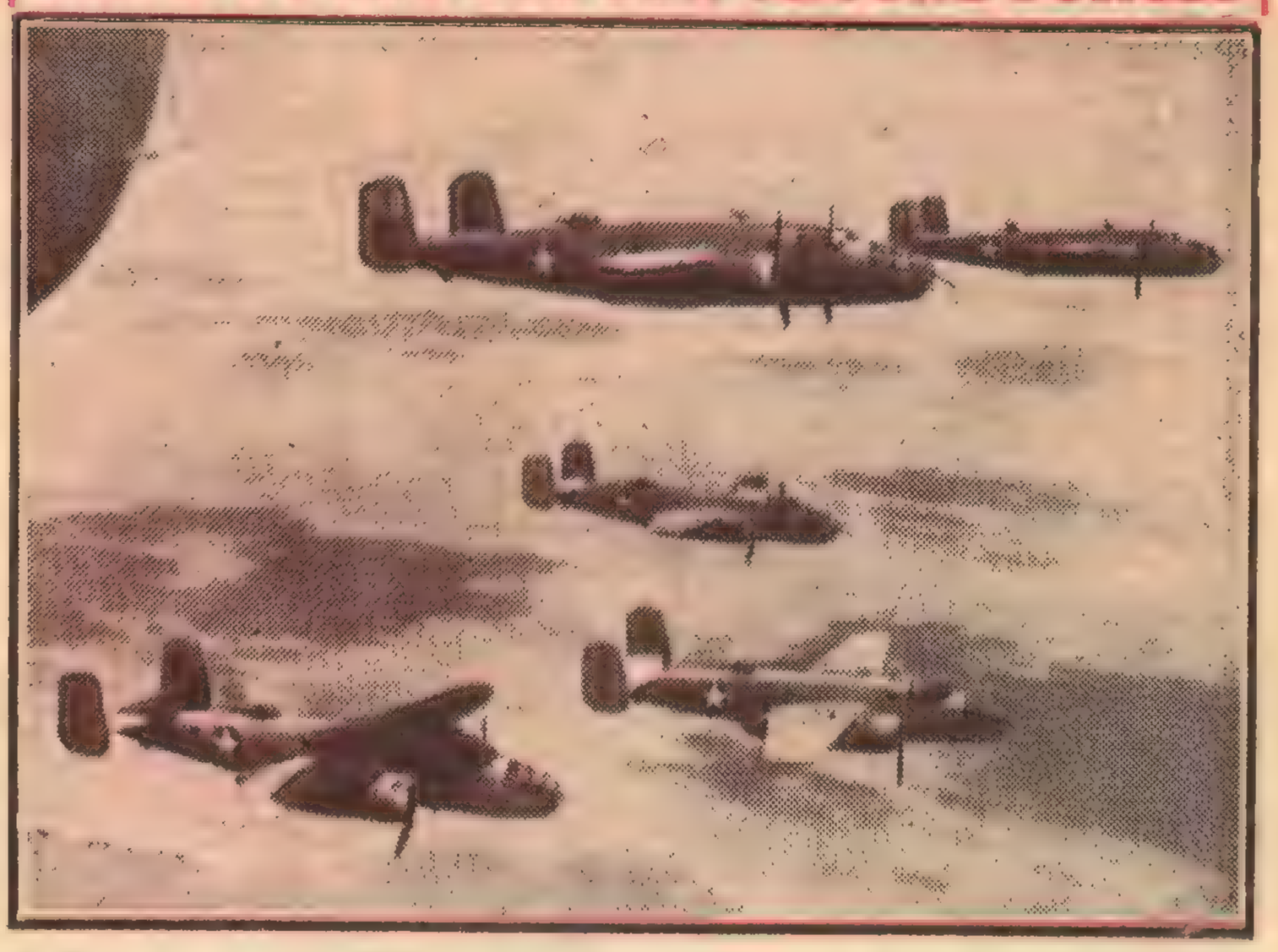
* * *

Another Success For Sister Kenny

AUSTRALIAN Sister Kenny's infantile paralysis treatment may be applied to other physical disabilities.

Major Vernon Hart, US Army, writing in the American Medical Association Journal, says that knee injuries may be possibly treated by the Kenny method.

AIR SUPPORT FOR OUR GROUND FORCES



"Where are our planes?" The tragic cry of Greece and Crete takes on a new significance as the words are rung from the tortured lips of Axis troops. Industrial might of the United Nations is beginning to tell. This picture shows a group of American Mitchell B-25 bombers on their way to blast enemy strongpoints. In six nights, Allied bombers dropped more than 1,000,000lb. of bombs on Rommel's Army in the Western Desert.

German Flame Throwing Tank

SWISS newspapers publish details of the latest German tank, which throws a fire jet 950 yards.

The jet ignites only during the last 300 yards, thus concentrating the heat.

The tank is able to screen itself with smoke within a few seconds.

* * *

New Explosive

ACCORDING to the Canadian Minister for Munitions, Mr. Howe, Canadian scientists have developed the most powerful explosive of the war. The explosive is now being manufactured in Canada for the Allies.

Plug-in Heater For Planes

COLD aeroplane motors may be quickly and safely thawed out and warmed up in an aeroplane heater, described in a patent granted at Washington, USA, recently.

The new heater is detachably mountable in the front opening of the engine cowling. Disc-shaped and made up of two separable sections, it fits into and acts as a seal for the opening of the cowling.

The sections fit snugly around the propeller shaft and have a contour which is normally set to conform to the cowling opening. An electrical heater is fixed on the inner side of one of the sections so as to extend inside the cowling when the sections are inserted into the opening.

To warm the engine, the heater is plugged into a source of electric current.

* * *

Water For Lifeboats

THE British Ministry of War Transport is considering inventions for converting sea water into fresh water for use in ships' lifeboats. Most are too heavy, but one firm is experimenting with a new type of distiller, designed to burn wood, even when soaked in sea water. This apparatus has been proved capable of distilling 20 pints of water by burning the wood obtained from a boat's oar.

SEAFIRE IS NEW NAVY FIGHTER

Britain's famous Spitfire planes have joined the Royal Navy under the name of "Seafires." The Fleet Air Arm will thus be provided with a swift and deadly fighter.

Seafires have already figured in the North Africa operations, protecting convoys and escorting warships before the Allied Forces occupied French airfields. Their potentialities in future sea-air battles are almost endless.

Common belief has been that single-seat fighters, equivalent to land-based fighters, could not operate from the decks of carriers. This conviction was jolted when it was proved in the August convoy to Russia that Hurricanes were fitted for such operations.

Experiments to give the Spitfires "sea-legs" have been going on for months with great secrecy, and, contrary to expectations, only slight modifications are needed. The structure has been strengthened to withstand the shock of landing on a moving deck. A hook is fitted in front of the tail for catching the arrester wires across the carrier deck.

No details of the Seafires' performance have been given. Fire power is a secret, though photographs show that two cannon at least are carried in the wings. There is no doubt that Seafires give a new umbrella of safety for ships. They will probably usher in a new era of fighting because they can hold their own with the best land-based fighters and bombers.

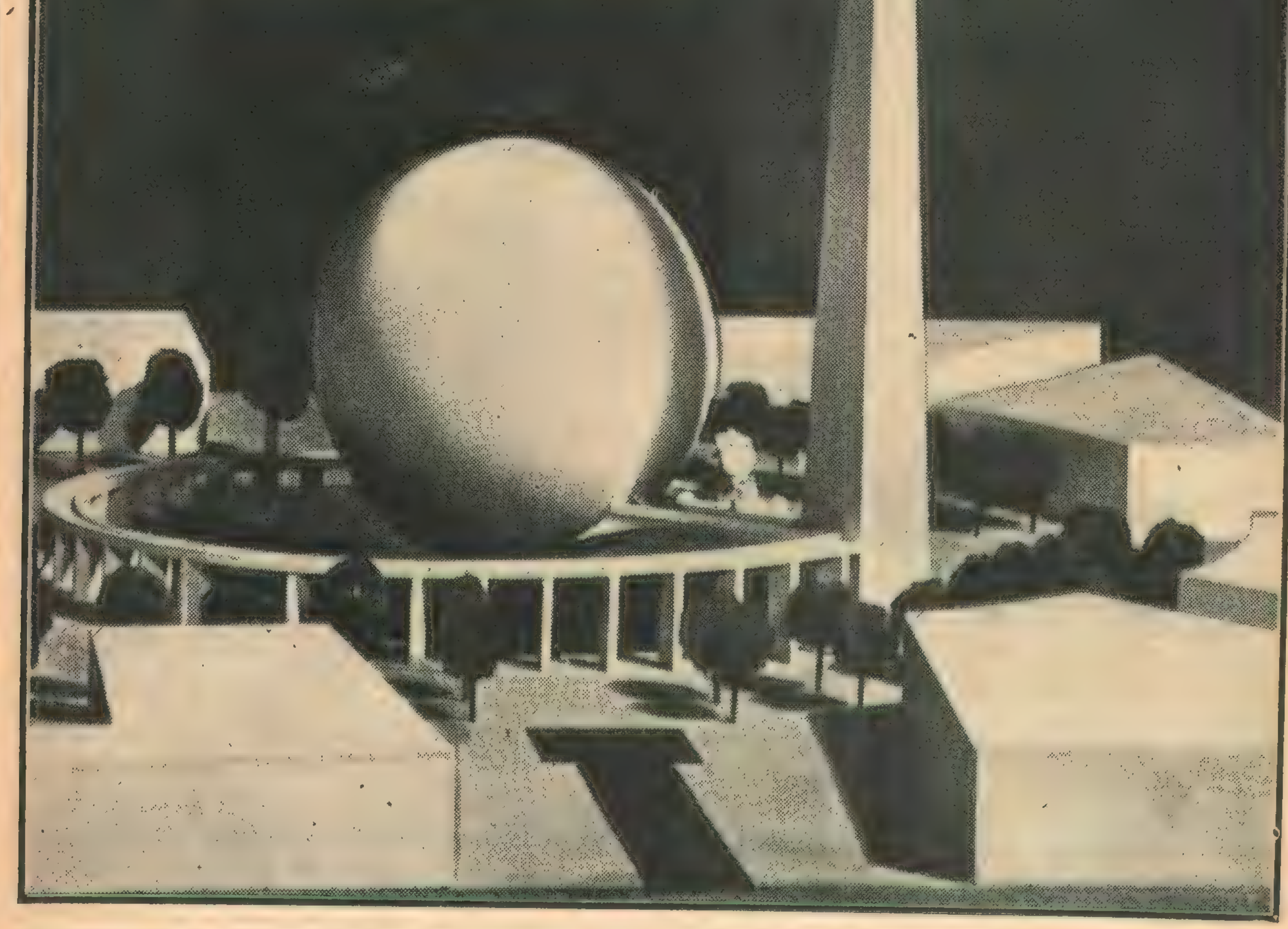
Foreword

SUCH was the success of our last Christmas issue, that we have been influenced to arrange this one also as a special review and service number.

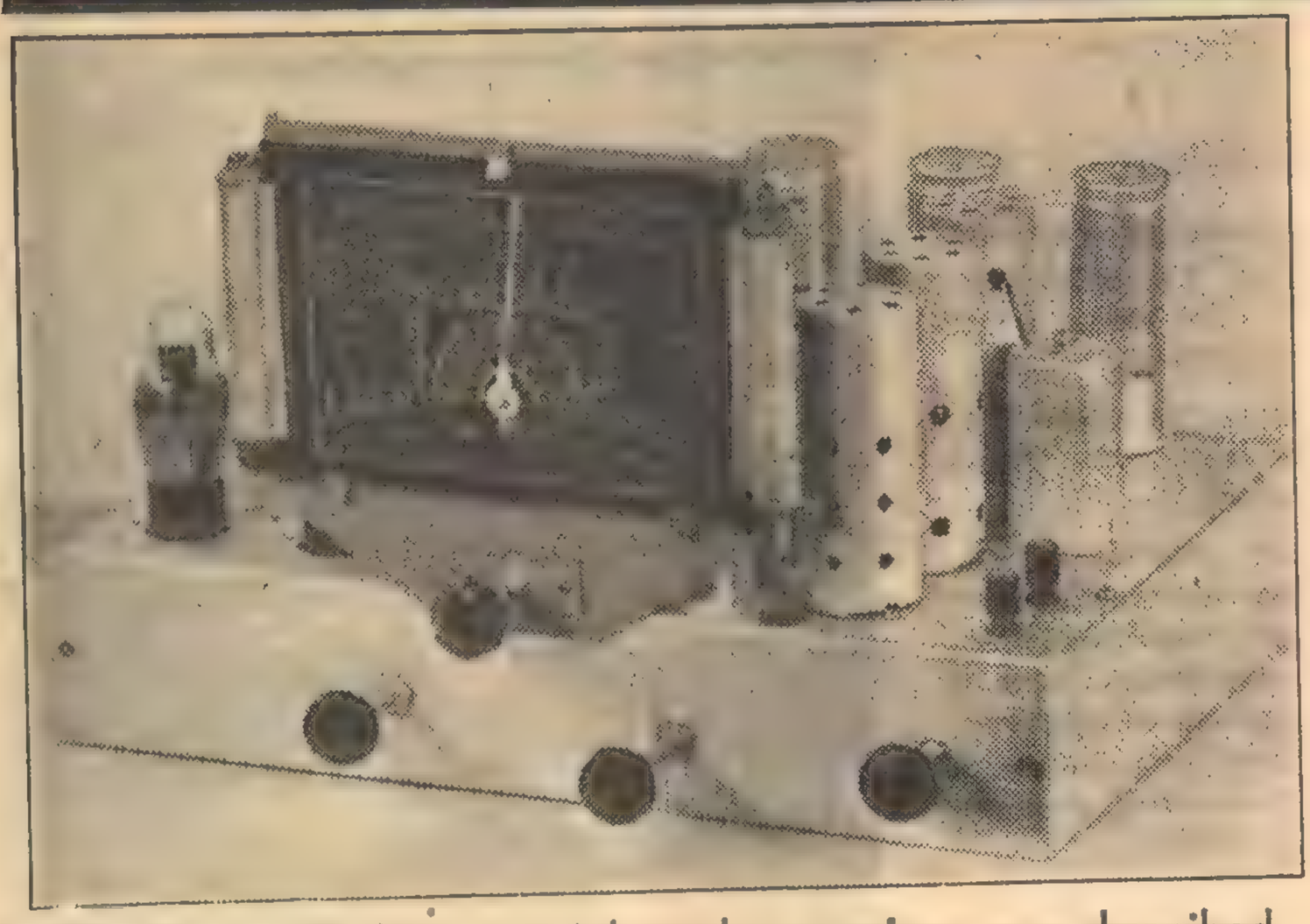
In the following pages, you will find a selection of circuits and data which should prove most useful.

The circuits are not presented with the idea of encouraging the construction of new receivers in these troublous times, but for purposes of reference and to provide, in one issue, a group of approved circuits for those readers who may wish to modify or rebuild an existing receiver to a more satisfactory design.

The station list and coil data are given in response to many requests.



THE R&H SENIOR RADIOGRAM EIGHT



The Senior Radiogram eight valve receiver was described in "Radio and Hobbies" for July, 1940. The circuit may be applied for either broadcast or dual wave reception and, fitted with modern coils and I-F transformers, will log any station worth listening to. The audio amplifier was designed for the quality fan and is capable of giving really fine reproduction of radio programmes and recordings.

THE 2A3 output valves operate under somewhat overbiased class A conditions and deliver an undistorted power output of about 7 or 8 watts. The use of resistance coupling throughout ensures level response and uniformity of performance. The 2A3's may be replaced by 6A3's without change apart from filament voltage.

The 6J7-G may be replaced by 6C6 or 57, and the 6C5-G by a triode-connected 57, 6C6, or 6J7-G, with due attention to heater voltage.

For the rectifier, type 5V4-G or 83V was originally specified. However, types 5U4-G or 5Z3, or even the 5Y3-G or 80, could be used with some reduction in the available high tension voltage and power output. For the power transformer, 125 milliamps is the lowest permissible current rating, and a 150 milliamp type could be used to advantage.

The 375-ohm back-bias resistor must be capable of dissipating 6 watts continuously, and, if a single resistor for the purpose is unobtainable, two parallel-connected 750 ohm 5-watt resistors could be used. Alternatively, the value may be made up by two suitable resistors connected in series.

For the screen supply of the first three valves, the circuit specifies the use of a voltage divider, preferably of 25,000 ohms resistance. Using a 6K8-G converter, the screens may, however, be supplied through a simple 15,000 ohm 2-watt resistor, or to parallel-connected 30,000 ohm resistors. Since the output valves are directly heated, bleed current is not important.

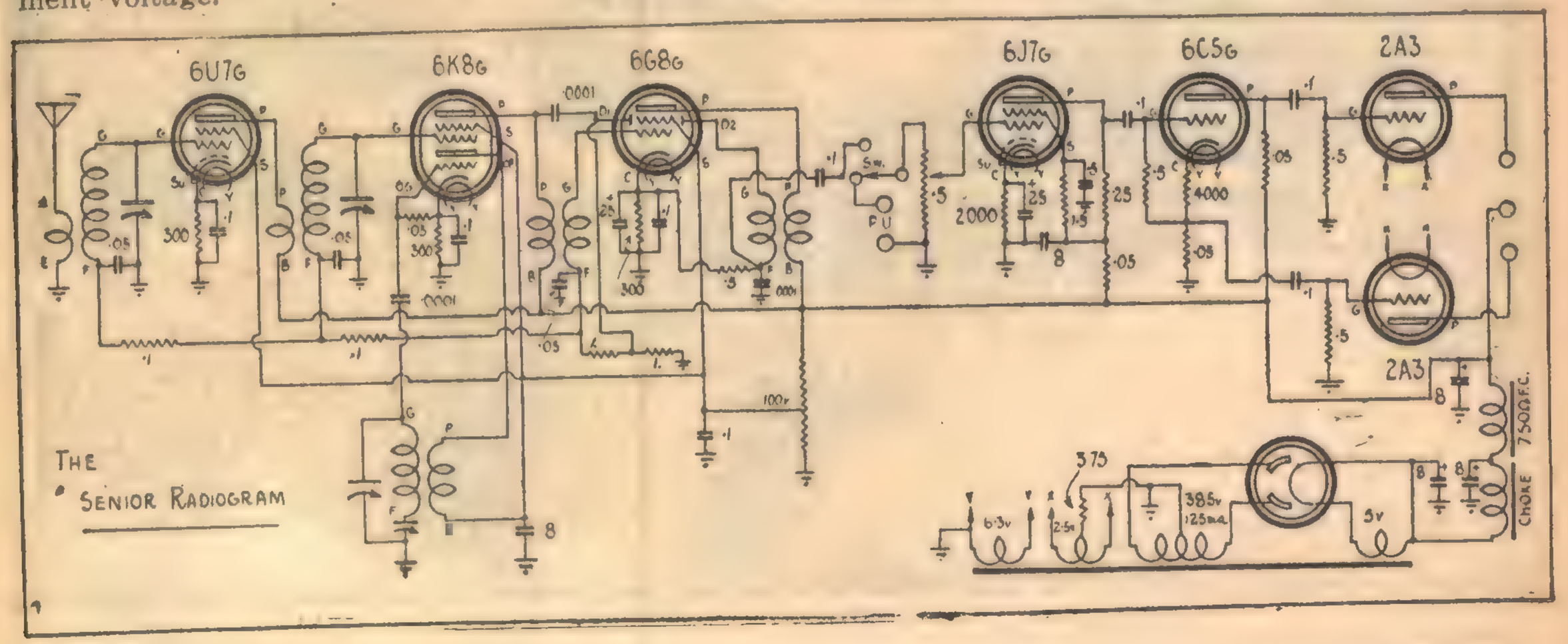
When using a 6J8-G, 6A8-G, 6A7, or 2A7 converter, the same screen supply network can be adopted as used in the "42/43 Standard" receiver and in the "Jeep" receiver shown elsewhere in the issue. The additional drain of the R-F amplifier screen makes little difference in practice.

Bypass the screens with a 0.1 mfd. condenser or larger, and feed the oscillator anode through a 20,000 ohm resistor, bypassed at the low potential end with a 0.1 mfd. tubular condenser.

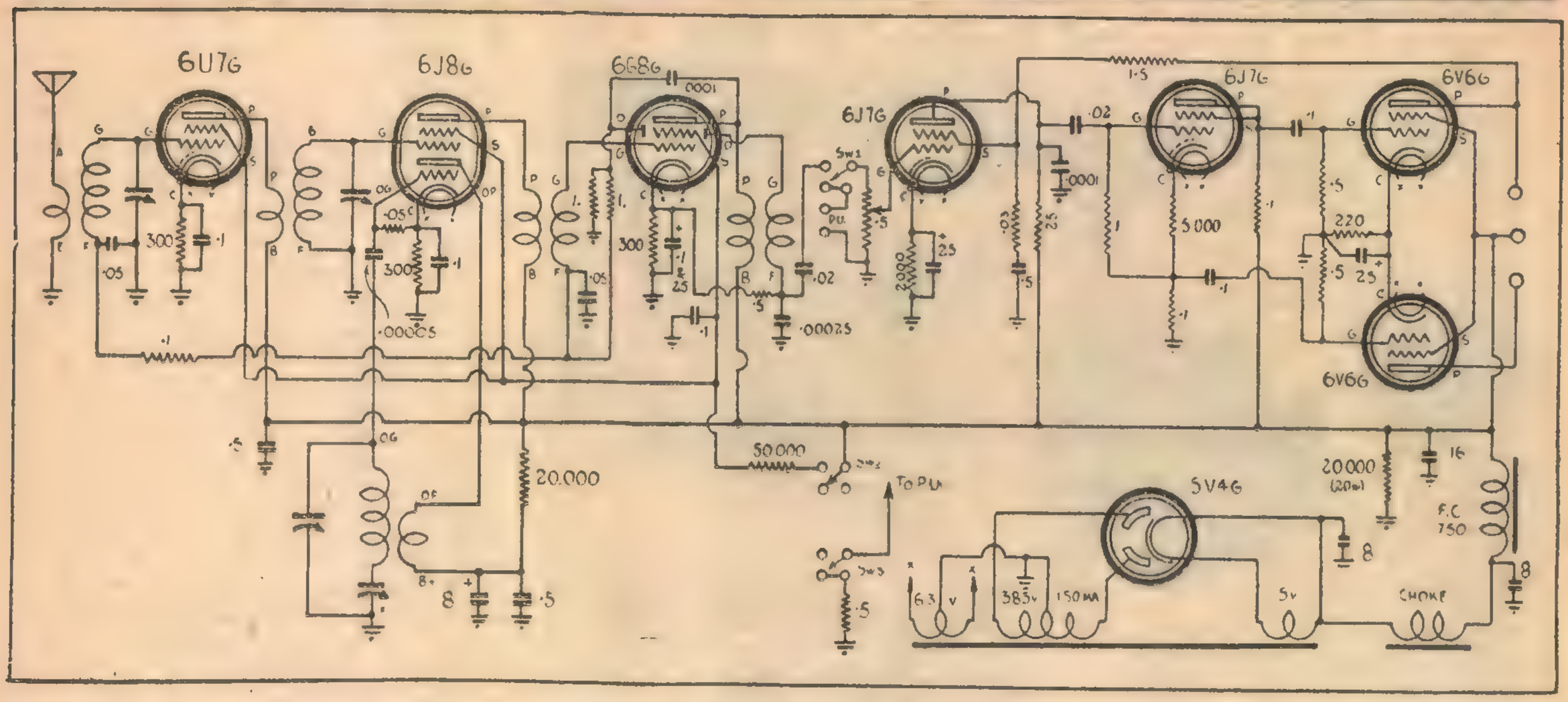
CIRCUIT AMENDMENT

A worthwhile amendment would be to replace the 0.5 meg. diode load with one of 0.25 meg., and to change the volume control to 1.0 megohm. If the pick-up switch fails to silence radio signals, use a two-way switch, wiring the second section to break the screen circuit of the 6G8-G, on the gramo positions.

Remember that the Senior Radiogram receiver has a very high overall gain. Every care must be taken to see that plate and grid leads are as short as possible. Shield the first four valves and all the "hot" leads to do with the input circuit of the 6J7-G.



AND THE NEW MAJESTIC FOR 1941



When type 2A3 valves became scarce, the New Majestic receiver was designed for the benefit of those readers who wanted the best. Described in "Radio and Hobbies" for April, 1941, the New Majestic is every bit as good as the Senior Radiogram as far as tone is concerned, and has nearly twice the power output.

SAID Mr. John Moyle at the time: "My own reaction is that the 1941 Majestic is the finest set ever described in an Australian magazine. It has my fullest recommendation."

Like the Senior Radiogram, the New Majestic employs a resistance coupled audio amplifier, which has excellent frequency response and distortion-free characteristics.

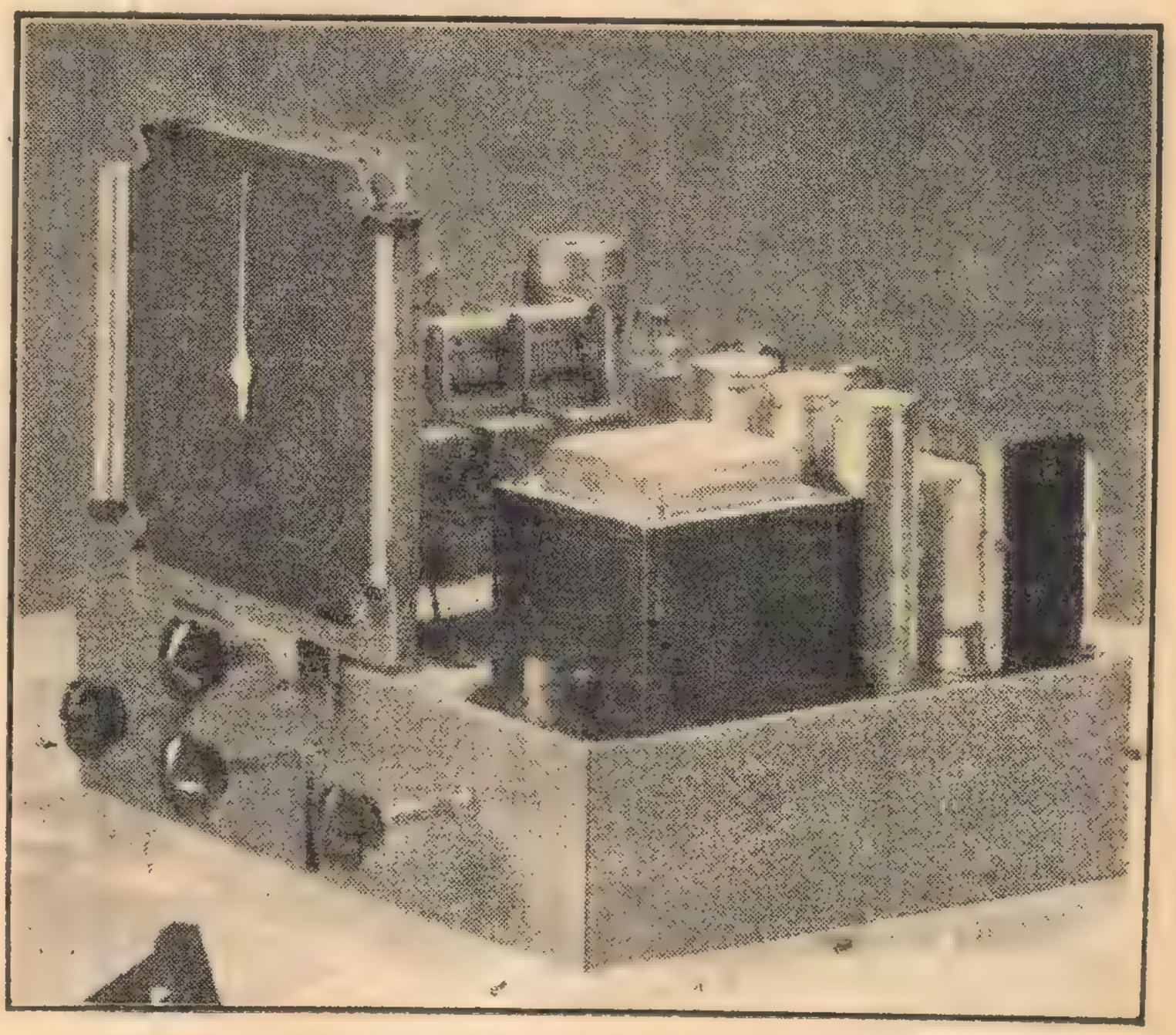
The output valves are 6V6-G beam-power tetrodes operating under class AB1 conditions. Power output is about 12 or 13 watts, depending on the exact high tension voltage available at the output of the filter. Quality comparable to that achieved with the triode output valves is assured by the use of negative feedback, applied in this case to the screen circuit of the first audio amplifier.

The rectifier specified is type 5V4-G or 83V. Type 523 or 5U4-G could be used with a slight reduction in high tension voltage and power output. The power transformer should preferably be rated at not less than 150 milliamps.

The 20,000 ohm bleed resistor specified must dissipate continuously about five watts. If a single resistor cannot be obtained for the purpose, a number of smaller resistors may be pressed into service, connected in series. A convenient arrangement would be four 5000-ohm wire wound resistors in series.

The bias resistor for the 6V6-G valves has to dissipate about two watts. A resistance value of 225, or even 250, ohms would be satisfactory. If a single resistor cannot be obtained, two suitable resistors connected in series or parallel may be pressed into service. Thus, a 500 and a 400 in parallel would give about the right value, or a 100 and a 125 in series.

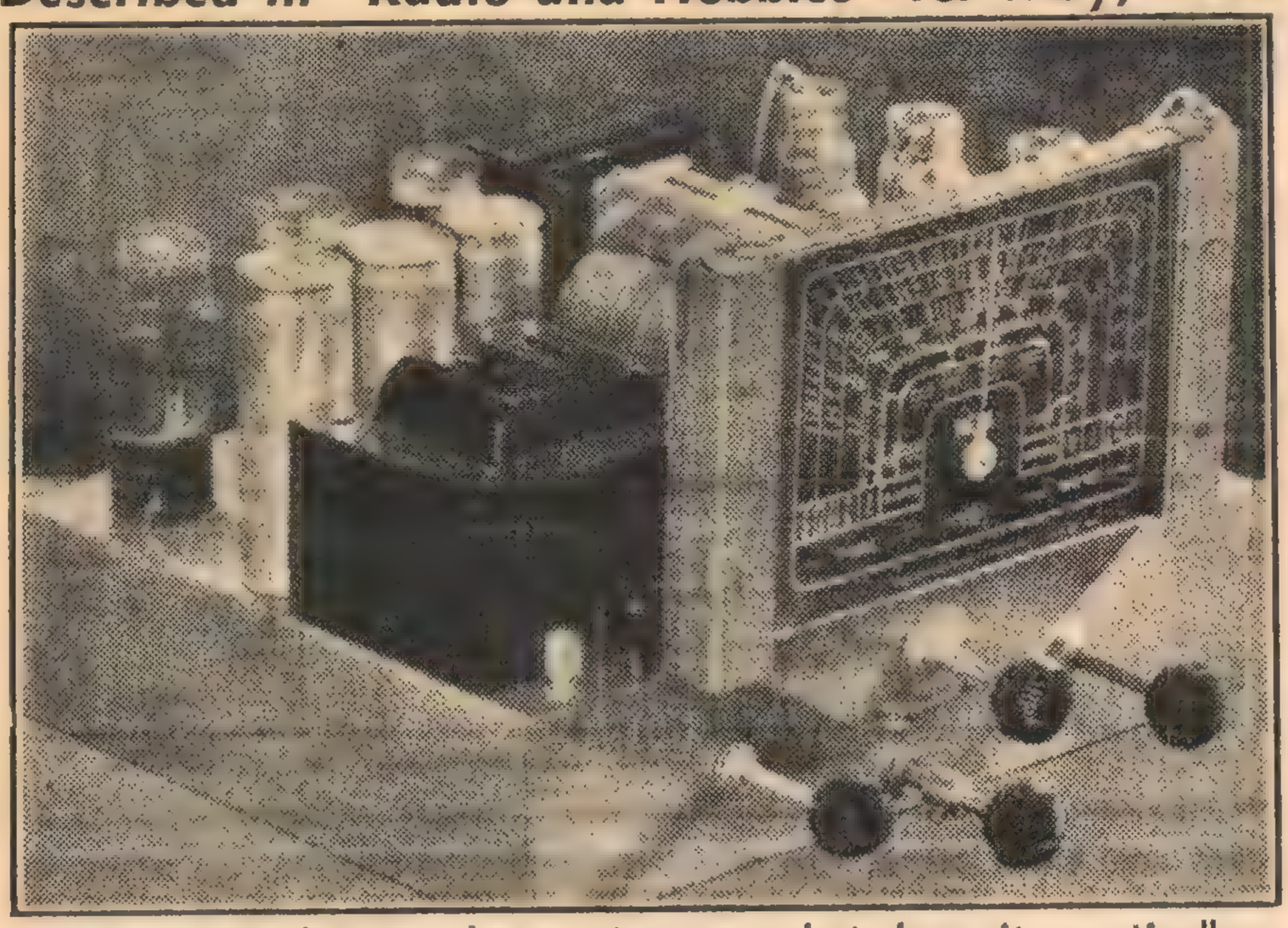
A worthwhile amendment to the circuit would be to change the diode load to 0.25 meg., and the volume control to 1.0 meg. The third section of the pick-up switch is used to introduce an additional load across the pick-up. This may be dispensed with, however, and the load connected, if necessary, directly across the pick-up terminals.



REVIEW

THE T.R.F. QUALITY SIX RECEIVER

Described in "Radio and Hobbies" for May, 1942



As regards ability to log stations superhets have it practically all their own way. However, their natural selectivity has the disadvantage that it causes undue attenuation of the higher modulation frequencies, robbing broadcast music and speech of the high order harmonics and overtones which make for utmost reality and "presence." Because TRF receivers are usually less selective, they do not exhibit the tendency to the same extent, the reproduction being rather more brilliant and lifelike as a consequence.

A VARIABLY selective superhet is the natural answer to the problem but, for home constructors, there are many difficulties. For the quality enthusiast a well designed TRF receiver is the easy way out.

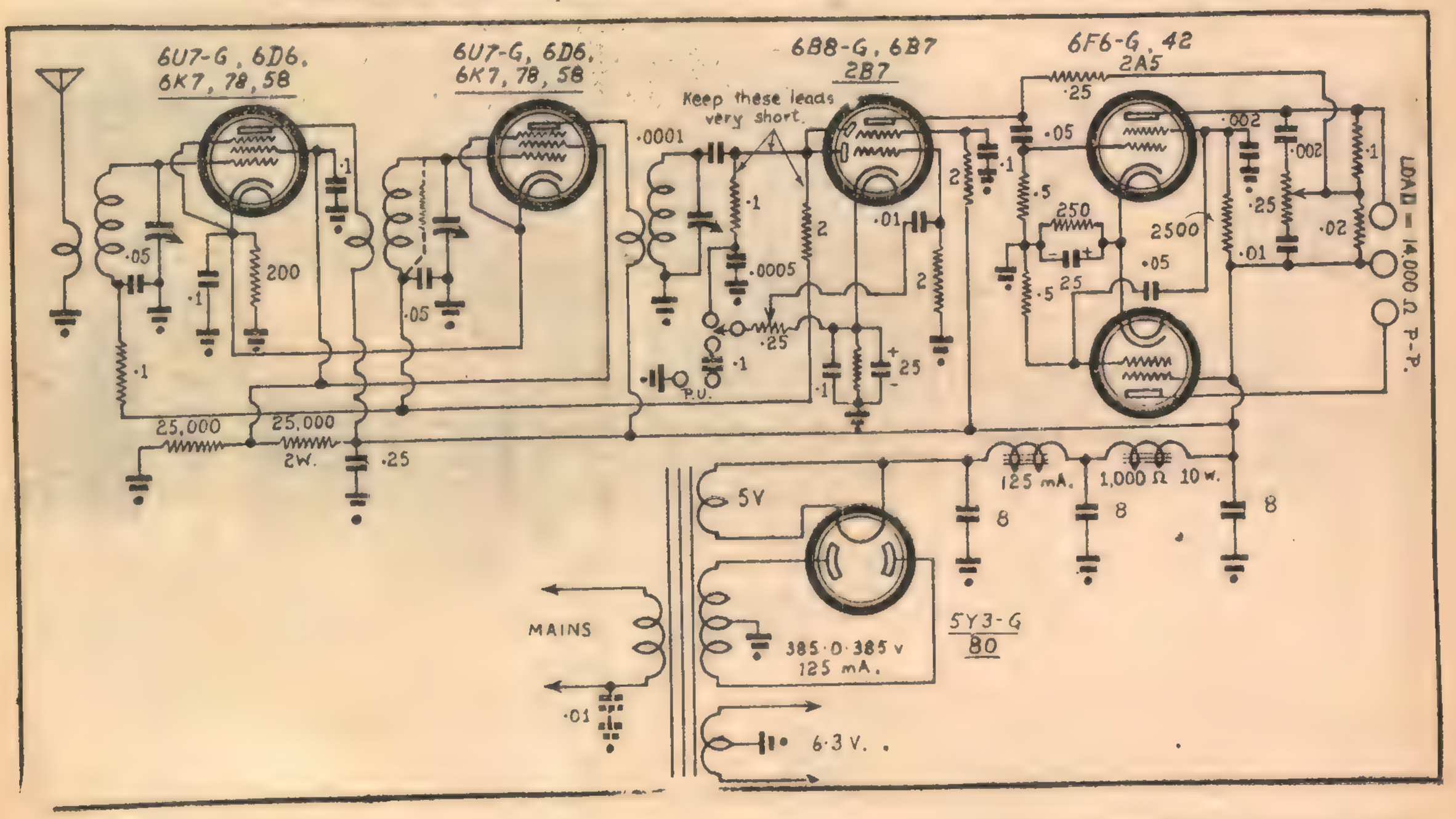
The TRF Quality Six is not an elaborate receiver, but it is, nevertheless, capable of really gratifying results on both radio and gramo. We have had many enthusiastic letters from readers who have built up this job.

Power output is about 8 or 9 watts, which is more than ample for the average home. The pentode output valves have negative feed-back applied, together with a system of tone-control which allows treble boost or cut to be obtained.

The original receiver was built up with iron-cored coils and, while allowing good fidelity on local stations, had ample gain and sufficient selectivity to bring in the main interstate stations. Selectivity may be reduced, if desired, by shunting the aerial and/or RF coils with resistors of 0.1meg. or less.

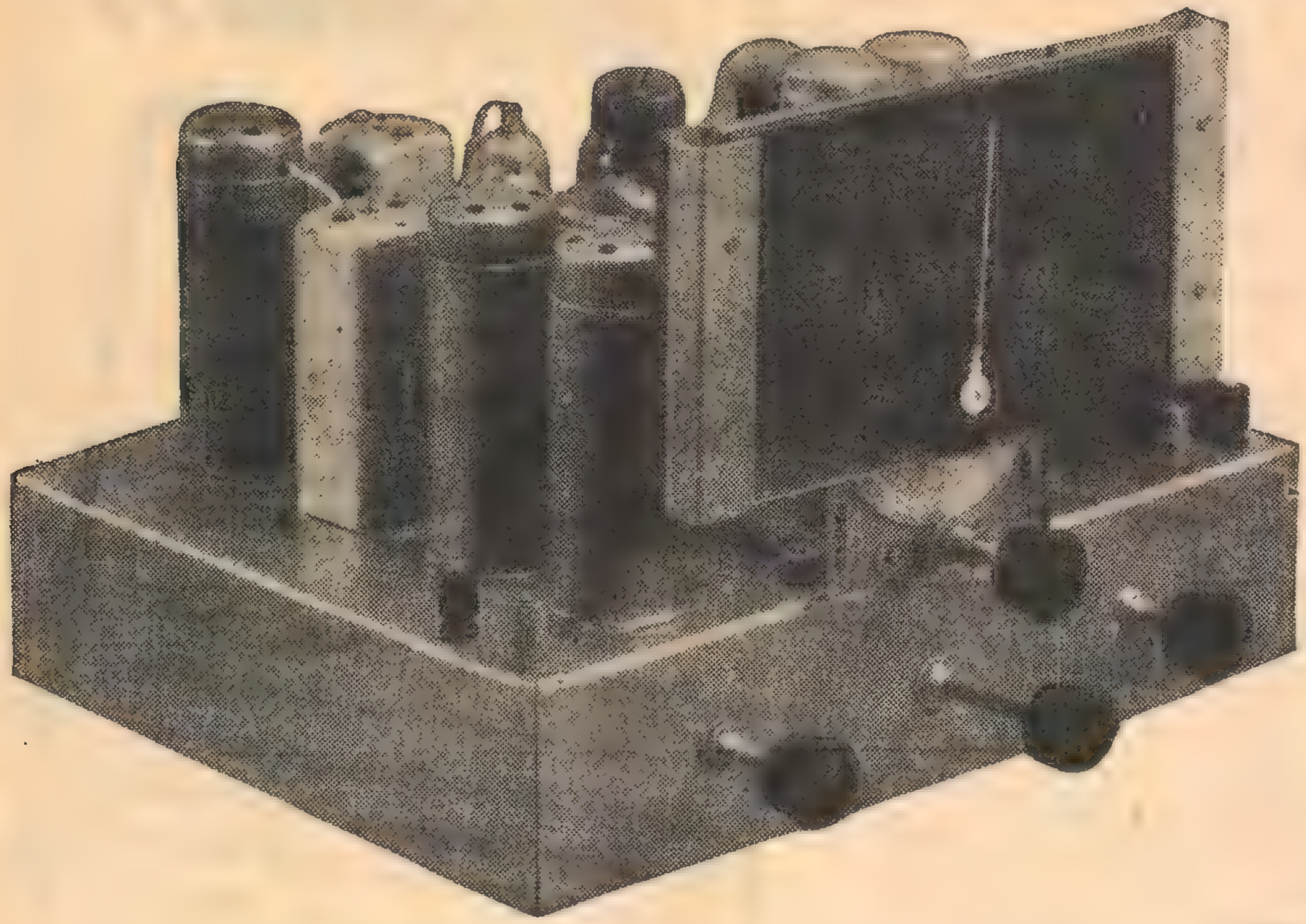
In wiring the receiver, keep the leads as short as possible between the diodes and the associated tuning circuit. Connect the 0.1 and the 2.0 meg. resistors right at the diode pins, so as not to introduce undue stray circuit capacitances.

The receiver should preferably be used with an earth wire, although a small mica condenser between the chassis and one side of the mains may have the required stabilising effect.



REVIEW

FOR DX RECEPTION—THE 1941 SUPER SIX



THERE are plenty of listeners who are quite satisfied with good average quality of reproduction but who look for a receiver capable of giving a good account of itself in the matter of logging distant stations. Chief among these are listeners in country districts and DX fans who sit for hours seeking faint and elusive signals on both the broadcast and short-wave bands.

The 1941 Super Six was designed with these requirements in view. The use of an RF stage ensures plenty of gain ahead of the converter, and, besides adding to the sensitivity and selectivity, ensures a better signal-to-noise ratio. This improved performance is obtained for the cost of one extra valve, a more complicated coil kit, an extra section on the tuning gang, and a few small wiring components.

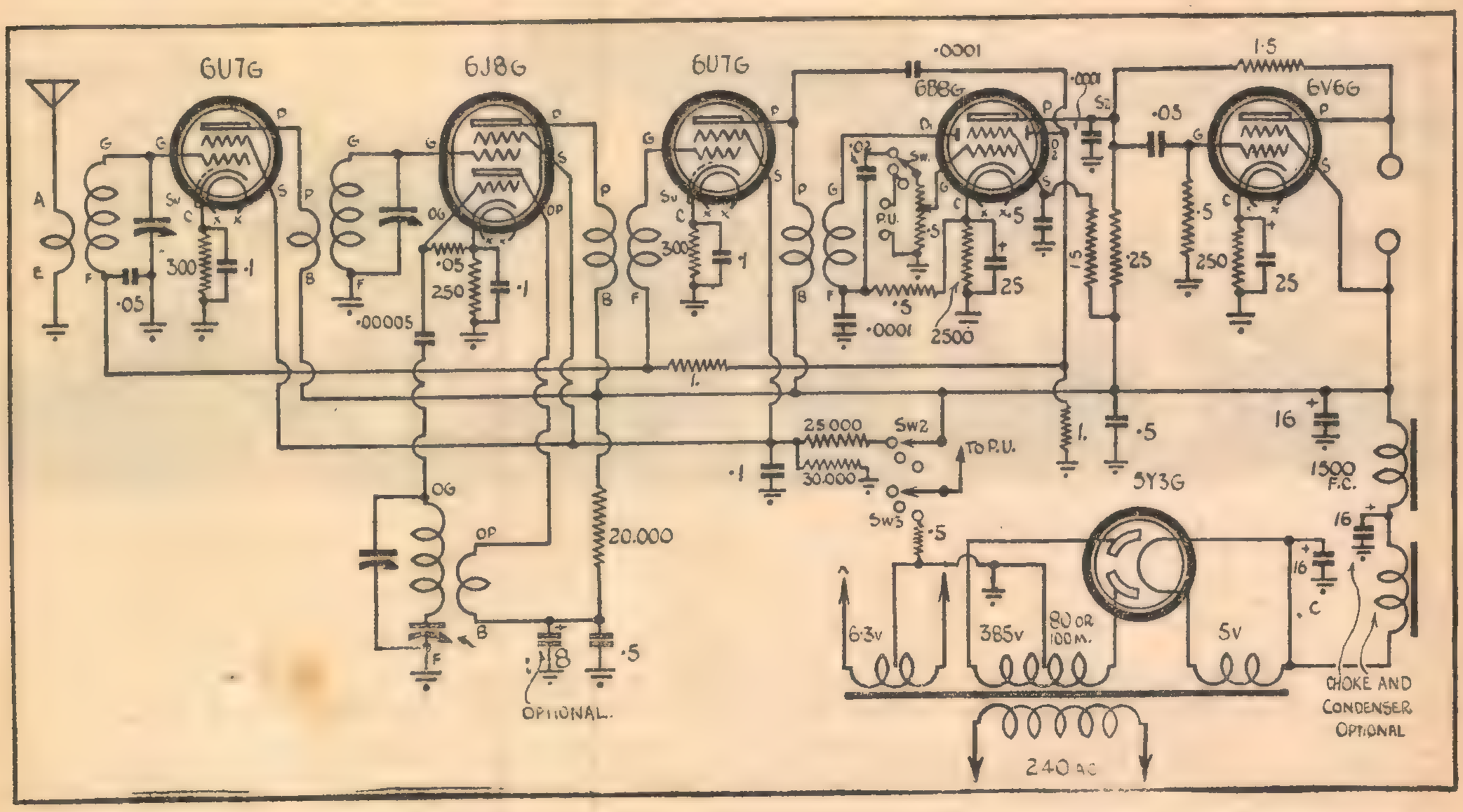
There were actually two versions of the Super Six. The broadcast version was described in the September, 1941, issue, and differs from the circuit below mainly in the inclusion of a special tone-control switching arrangement.

The circuit below is actually that of the dual-wave version, described in the October, 1941, issue. However, it could be built as a straight-out broadcast version without any difficulty.

For the position of RF and IF amplifier, alternative valve types are the 6K7, 6K7-G, 6K7-GT, 6D6, 78, 58, &c. For the converter, possible alternatives are the 6A8-G, 6A7, or 2A7; for the position of second detector, 6B7 or 2B7. The 6F6-G, 42, 2A5, or 47 could be used in the output stage by changing the bias resistor to 400 ohms.

The pick-up switching system is similar to that employed in the New Majestic receiver, and the previous remarks apply. There would be an advantage in reducing the diode load resistor to 0.25meg. and increasing the value of the volume control to 1.0meg.

The 8mfd. condenser bypassing the oscillator coil is optional. Its purpose is to prevent motor-boating or fluttering on strong short-wave signals.

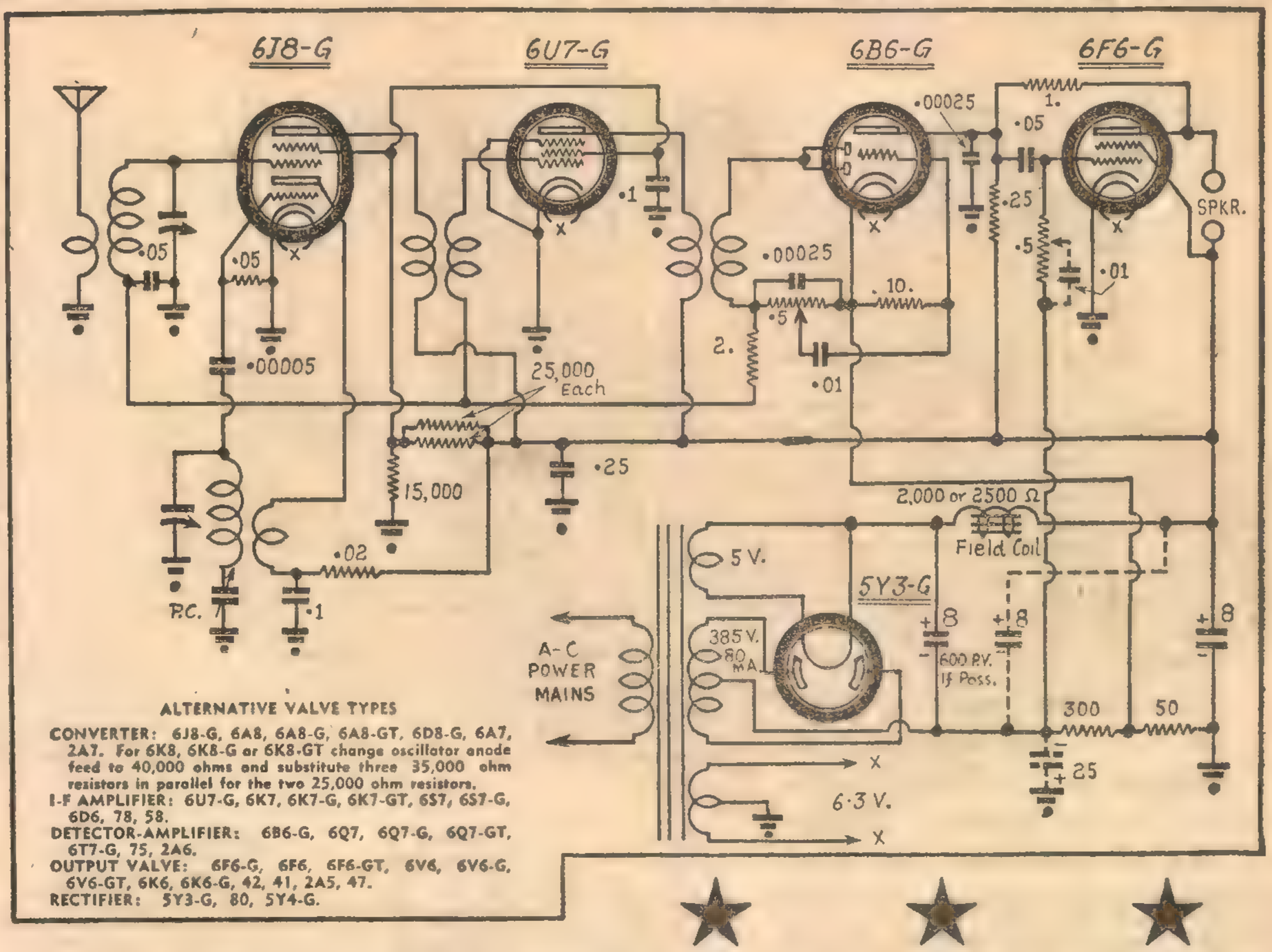


"JEEP" 5-VALVER & THE 42/43 STANDARD

★

This review issue would not be complete without the circuit diagram of the "Jeep" 5-valve receiver and the 42/43 Standard. The Jeep was described in the October 1942 issue and was designed with a view to simplicity and to allow the widest possible choice of component parts. Already many readers have reported excellent results with this circuit, which is ample proof that performance has not been sacrificed. The receiver may be built up either as a straight broadcast or as a dual wave job. The components shown dotted are optional and may be omitted if the hum level is considered sufficiently low.

★

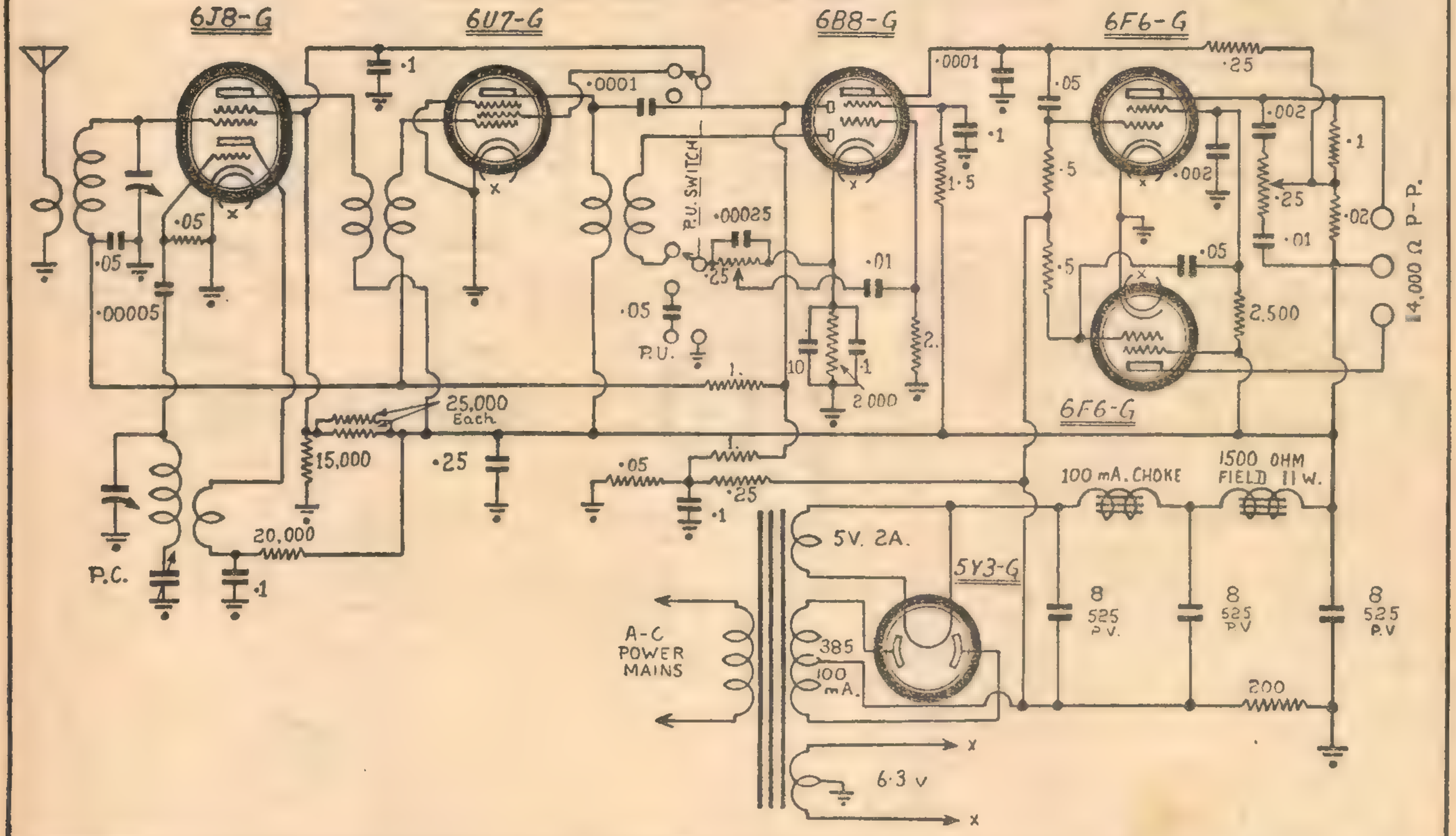


ALTERNATIVE VALVE TYPES

CONVERTER: 6J8-G, 6A8, 6A8-G, 6A8-GT, 6D8-G, 6A7, 2A7. For 6K8, 6K8-G or 6K8-GT change oscillator anode feed to 40,000 ohms and substitute three 35,000 ohm resistors in parallel for the two 25,000 ohm resistors.
I-F AMPLIFIER: 6U7-G, 6K7, 6K7-G, 6K7-GT, 6S7, 6S7-G, 6D6, 78, 58.
DETECTOR-AMPLIFIER: 6B6-G, 6Q7, 6Q7-G, 6Q7-GT, 6T7-G, 75, 2A6.
OUTPUT VALVE: 6F6-G, 6F6, 6F6-GT, 6V6, 6V6-G, 6V6-GT, 6K6, 6K6-G, 42, 41, 2A5, 47.
RECTIFIER: 5Y3-G, 80, 5Y4-G.

★ ★ ★

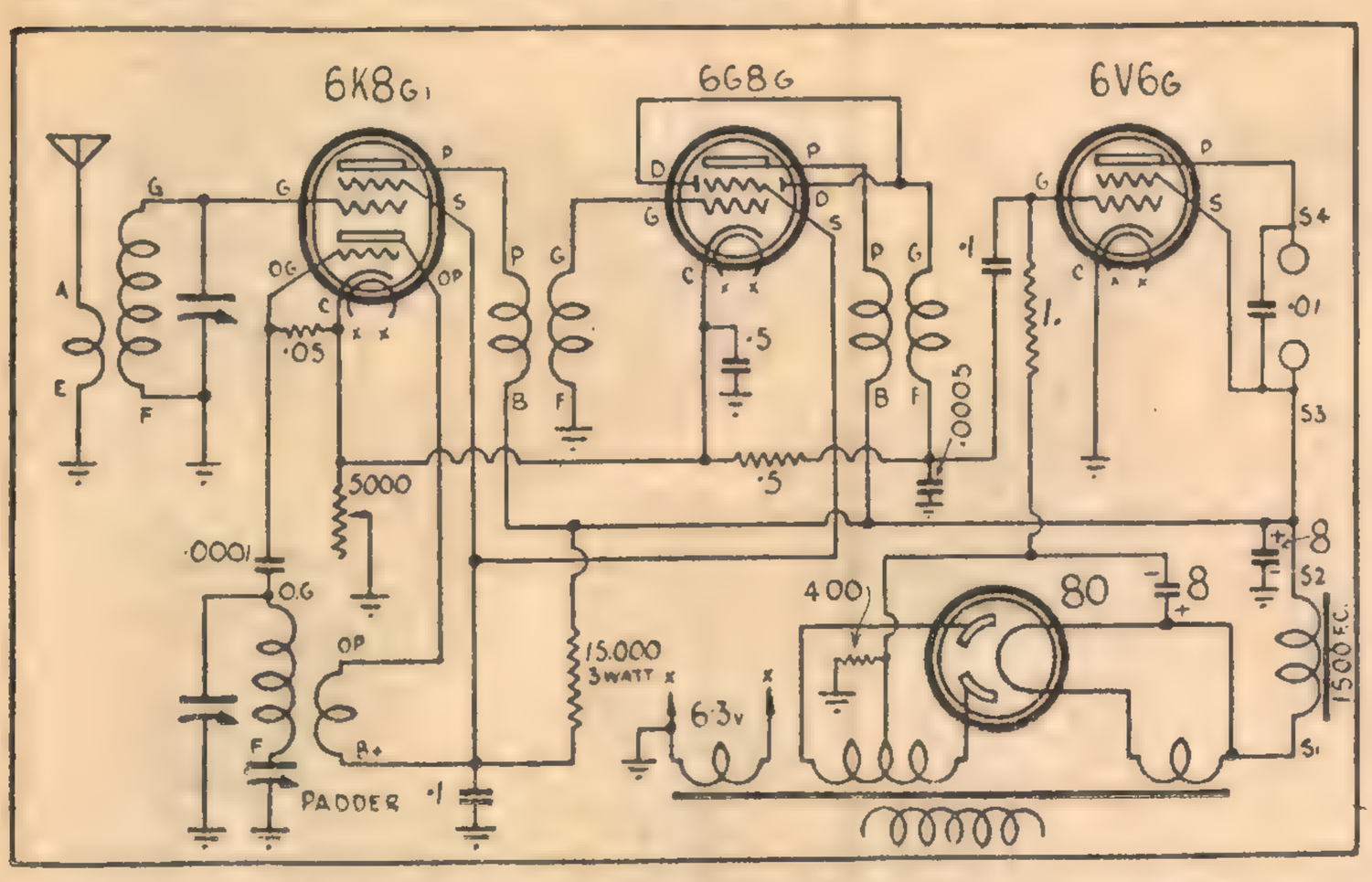
THE R&H 42/43 STANDARD



Described only in our last issue, the R&H 42/43 Standard is our answer to the demand for a simple and economical circuit to give quality reproduction of radio programmes and recordings, together with good average station-to-station performance.

REVIEW

THREE VERSIONS OF "LITTLE GENERAL"



Perhaps the most popular receivers ever described in "Radio and Hobbies" were the "Little General" series. We do not know just how many were made up, but the figure must run to many thousands. Small in size, economical to build and a tiger for performance, "Little General" met ideally the popular demand for a second set.

THE original "Little General" receiver, the circuit of which appears above, was described in "Radio and Hobbies" for April, 1940.

In October, 1940, we published a modified circuit under the heading, "More Gain For the Little General," using a 6F7 as I.F. amplifier and detector. In June, 1941, came a version with a loop aerial and in December of the same year the "Dual-Wave Little General."

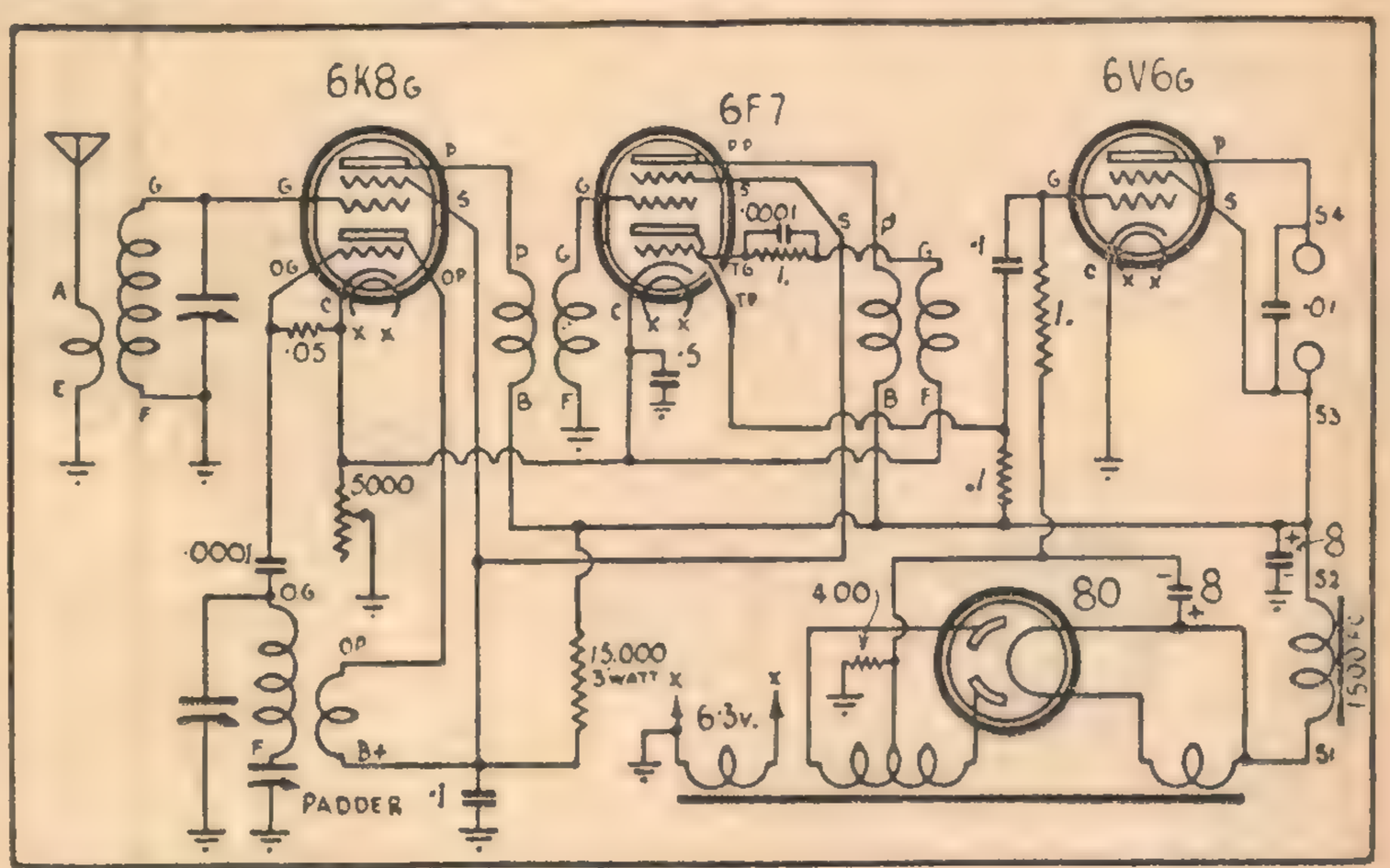
The original "Little General" is about as simple as a small superhet can be, without going to rather impractical extremes. It has two controls, one for tuning and the other for manual control of volume—or should we say gain. It was intended particularly for broadcast operation and the ready-cut chasses and cabinets were arranged to suit. The speaker is a small 5in. job and the power transformer a special 325 volt, 40 milliamp upright type.

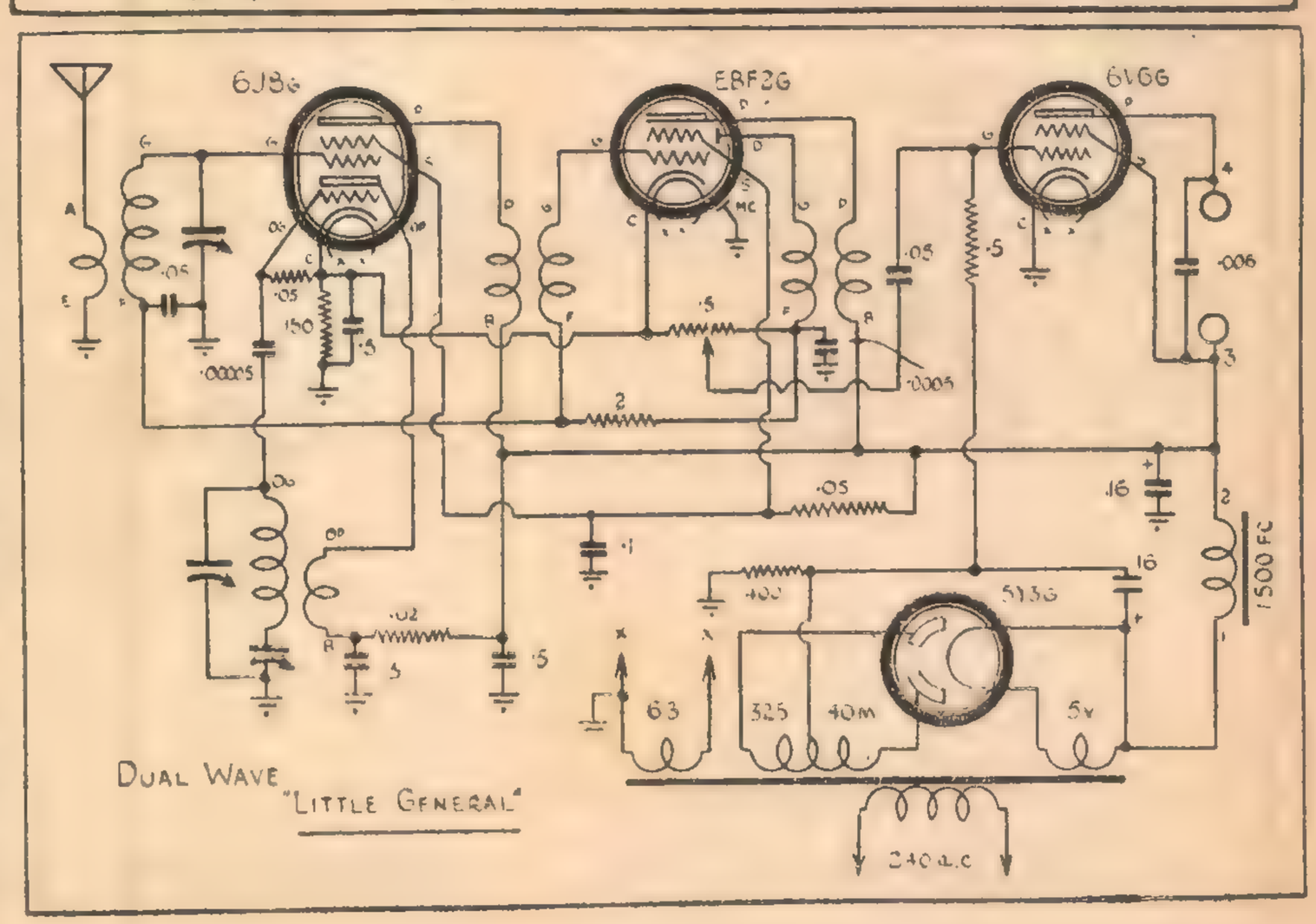
The second circuit, using a 6F7 or its equivalent type 6P7-G, makes possible greater overall gain, but requires a valve which was and is rather difficult to obtain. Note that a 6F7 can be used in the original "Little General" circuit by using the pentode section in place of the pentode section of the 6G8-G and the triode grid as the diode detector. Connect the triode plate to cathode.

The loop aerial version has the advantage that it does not require the connection of an exterior aerial wire. Reception is good, although possibly less satisfactory than with a conventional aerial coil and an average indoor aerial.

The dual-wave "Little General" is a more elaborate receiver, employing A.V.C. and a higher gain I.F. amplifier. Despite the limited number of valves, the receiver is capable of playing the stronger short-wave stations at plenty of volume—with, of course, a reasonably efficient indoor or an outdoor aerial.

An ordinary 385-volt power transformer delivers too high an output voltage for convenient application to these receivers. However, a voltage drop could be introduced by connecting a heavy duty resistor of a few hundred ohms between the filament of the rectifier and the junction of the first filter condenser and field.





DUAL WAVE "LITTLE GENERAL"

BACK ISSUES OF "RADIO & HOBBIES"

WE receive many inquiries in regard to back issues of "Radio and Hobbies." The present review number will probably give rise to quite a lot more.

Only a very limited number of back issues are available, as indicated by the following list; an asterisk indicates that stocks of the particular issue are very small, and may be exhausted by the time this list is in your hands:—

July	1939*	May	1941*
October	1939	June	1941
December ..	1939*	July	1941
February ..	1940	August	1941
July	1940	September ..	1941
August	1940*	October	1941
September ..	1940*	November ..	1941
October	1940	December ..	1941
December ..	1940	Christmas ..	1941*
Christmas ..	1940*	February ..	1942
March	1941*	March	1942
April	1941*	May	1942

The price of all back issues is sixpence plus one penny per month out of date. This means that some of the earlier issues become rather expensive, but the arrangement deters new readers from buying up a lot of back numbers for general interest, and preserves the few spare copies for enthusiasts who want a particular issue for some article or circuit which it contains.

Back numbers still in stock may be obtained by writing in, enclosing stamps or a postal note for the necessary amount; postage is free. Alternatively, they may be picked up from the Back Dates Department, on the eighth floor of the Sun Building, 60-70 Elizabeth-street, Sydney (near Martin-place).

Readers wishing to obtain particular issues no longer in stock may be able to procure them by advertising in our "Wanted to Buy, Sell, or Exchange" columns at the prescribed rate.

WE DO NOT SELL RADIO PARTS

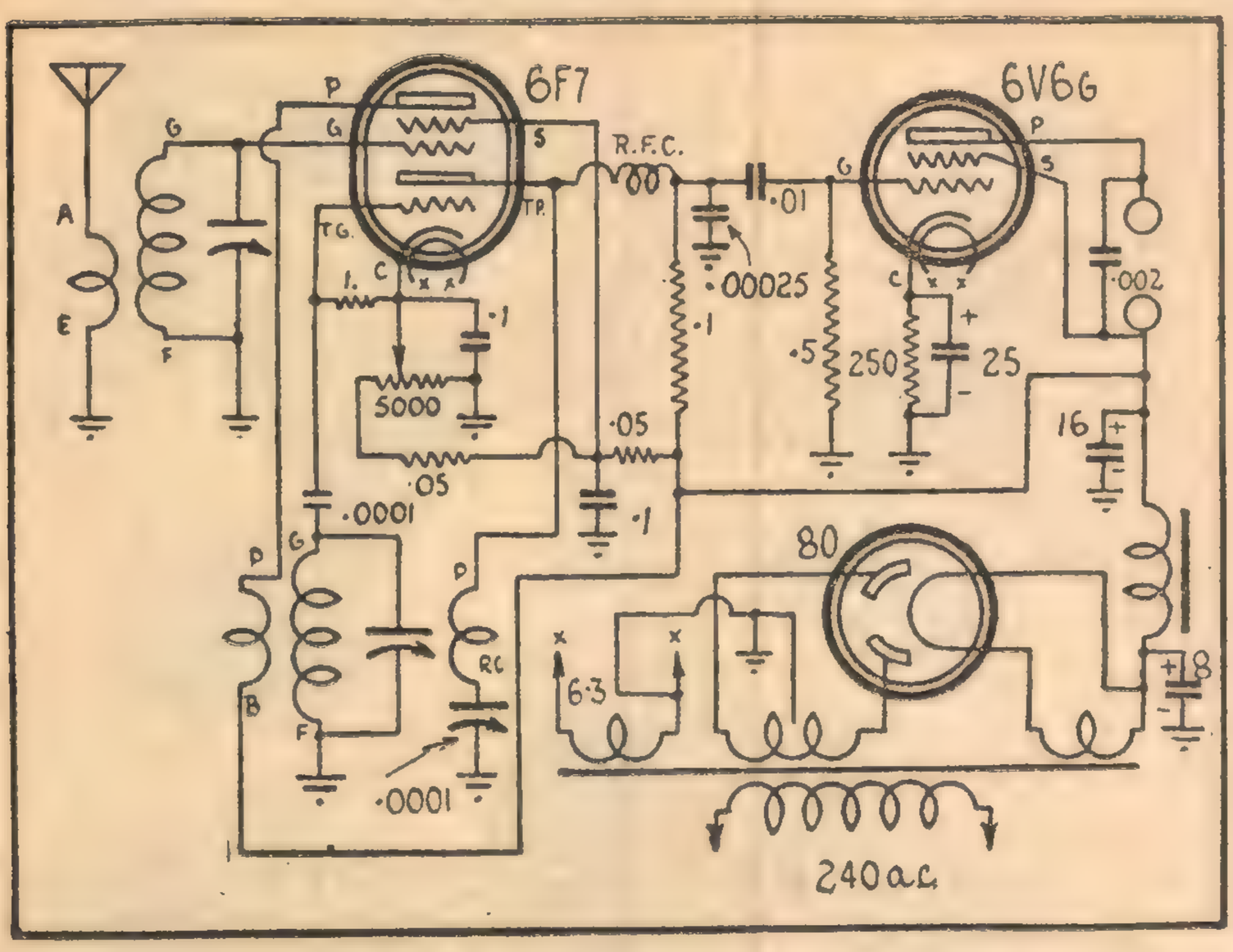
APPARENTLY quite a few of our readers are under the impression that "Radio and Hobbies" distribute radio components mentioned in the various technical articles, but this is not the case. Readers, who from time to time attempt to place orders with us, are simply referred to one or other of our advertisers.

We are often requested by readers to quote the approximate prices of complete kits of parts, or to comment in our correspondence on prices of individual radio components.

While estimates and comments may be helpful to some, they are very liable to lead to misunderstanding, especially under the present unstable trading conditions. We therefore make it a practice to avoid all such reference.

If you want to know the price of any particular component or kit of parts, write in to one of our advertisers.

"THE SERGEANT MAJOR" AND "TINY TIM"



Two of the most popular of our small a-c mains receiver circuits are the "Tiny Tim" and the "Sergeant Major." Certain of the valves and components needed for their construction are no longer available, but the number of inquiries received indicates that many enthusiasts have all the necessary "bits and pieces" in their collection of spare parts.

Small receivers of this type are quite useful in ordinary suburban locations, and will give loud-speaker reception of the local stations. Selectivity is not of a high order, but, by careful choice of aerial and by judicious use of the reaction control, quite good results can be had.

Selectivity is always at its best with the reaction set just below the point of oscillation. If, in the case of "Tiny Tim," operation under this condition is not possible because of excessive output, the aerial can be shortened or, better still, an audio volume control can be added.

AERIAL, EARTH

For use outside metropolitan areas, an effective aerial and earth is essential. For listening to weaker stations, earphones may be coupled to the output circuit through a 0.1 mfd. blocking condenser.

By arranging a system of plug-in coils, good headphone reception would be obtained from short-wave stations.

"Sergeant Major" was described in "Radio and Hobbies" for June, 1940. The circuit reprinted on this page has been amended in one or two respects, as will be seen by comparison with the original

The 6F7 triode-pentode serves as a combined R-F amplifier and regenerative detector. Selectivity is therefore rather better than in the more usual two-valve receiver not employing an R-F stage. The 6V6-G will provide plenty of power output on all signals strong enough to load up the detector circuit. A good aerial and earth is desirable for best results.

Total current drain is about 60 milliamps. Using a standard 385 volt power transformer, an 8in. electro-dynamic with 2500 ohm field is most suitable. With a smaller speaker, using, say, a 1500 ohm field, a power transformer delivering about 325 volts would be about right. In this case, it would be an advantage to overbias the output valve, using a resistor of about 300 or 325 ohms.

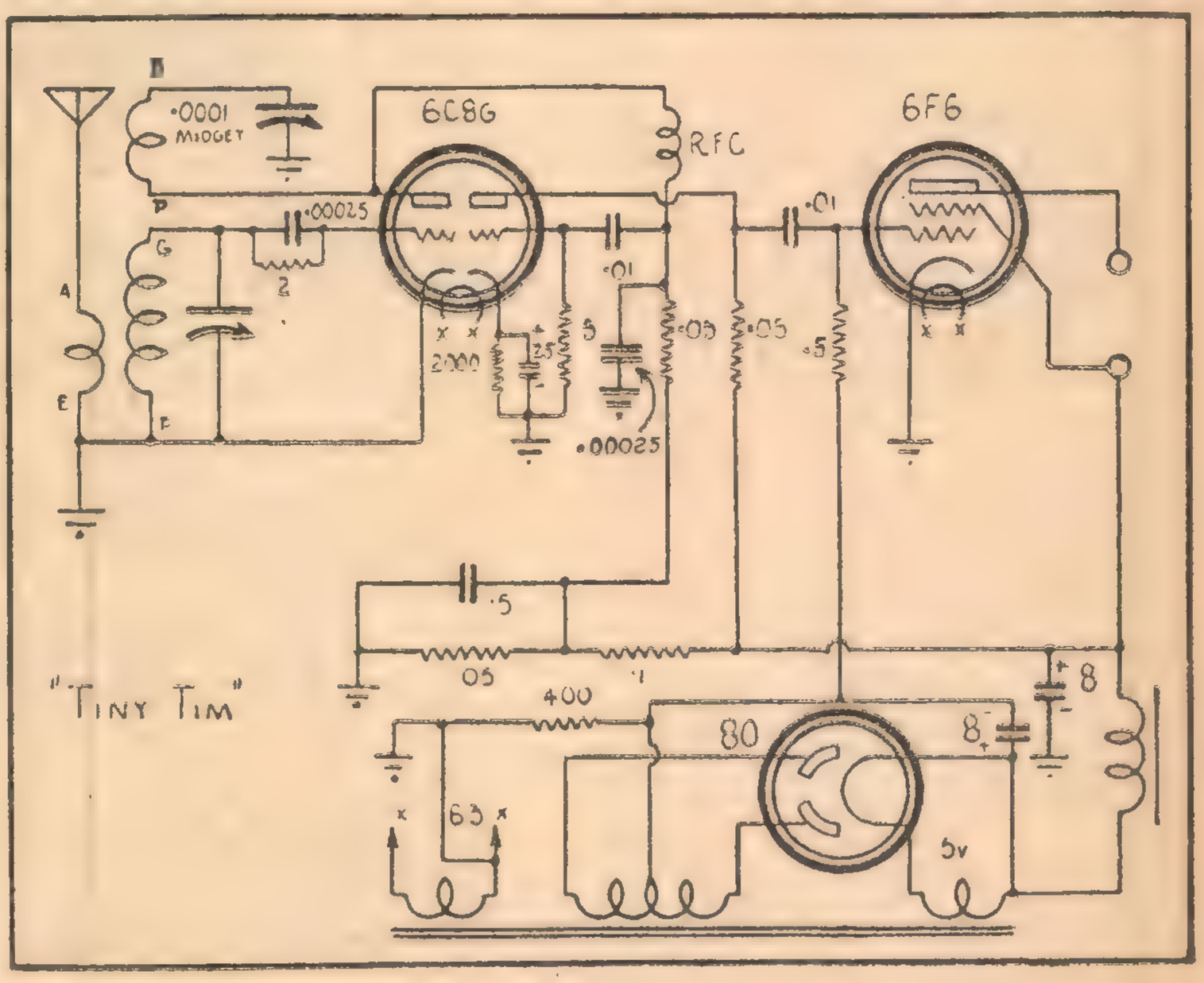
TINY TIM

"Tiny Tim" was described in the September, 1939, issue. The circuit reprinted here has also been amended slightly. "Tiny Tim" differs from "Sergeant Major" in that it does not use an R-F stage, but has higher audio gain.

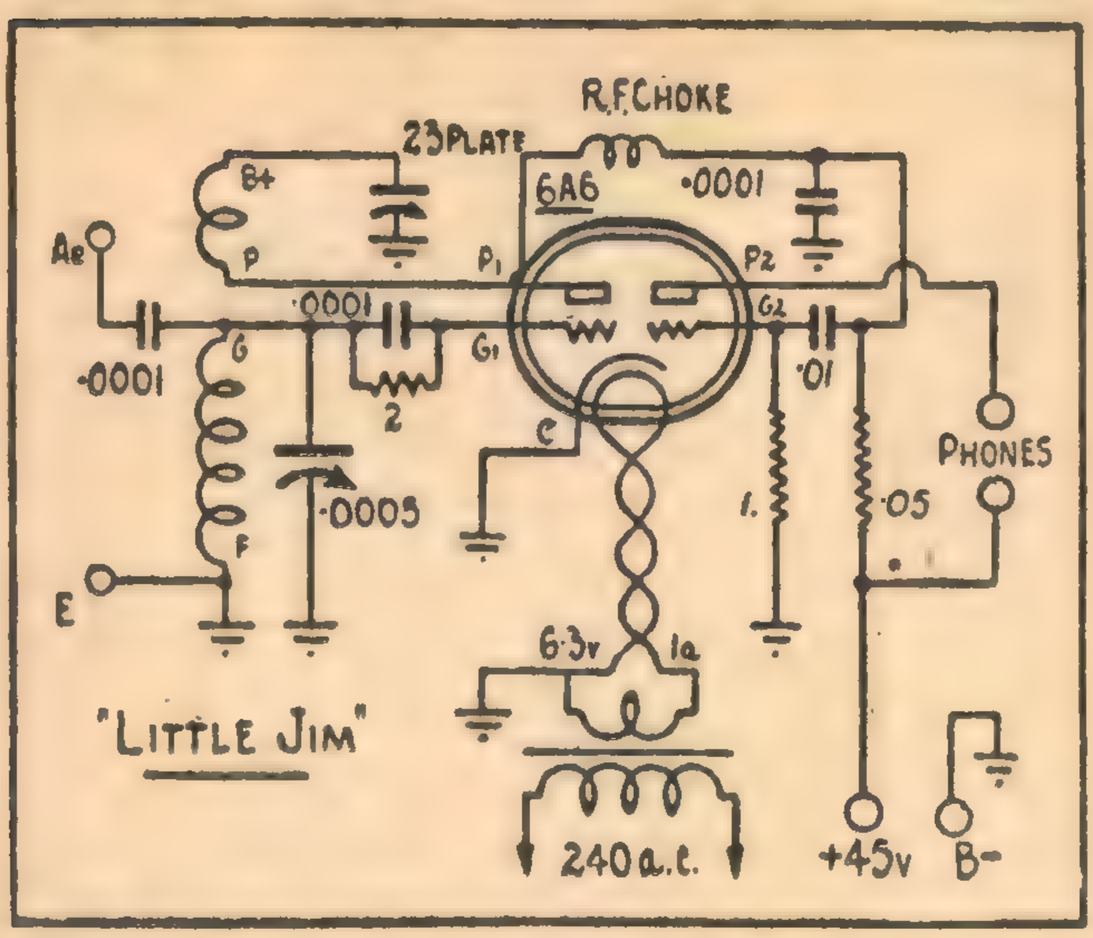
To allow full use to be made of the reaction, it is suggested that a 0.5 meg. volume control be installed in the grid circuit of the audio amplifier portion of the 6C8-G, the grid connecting to the moving tap instead of to the upper end of a fixed resistor, as at present.

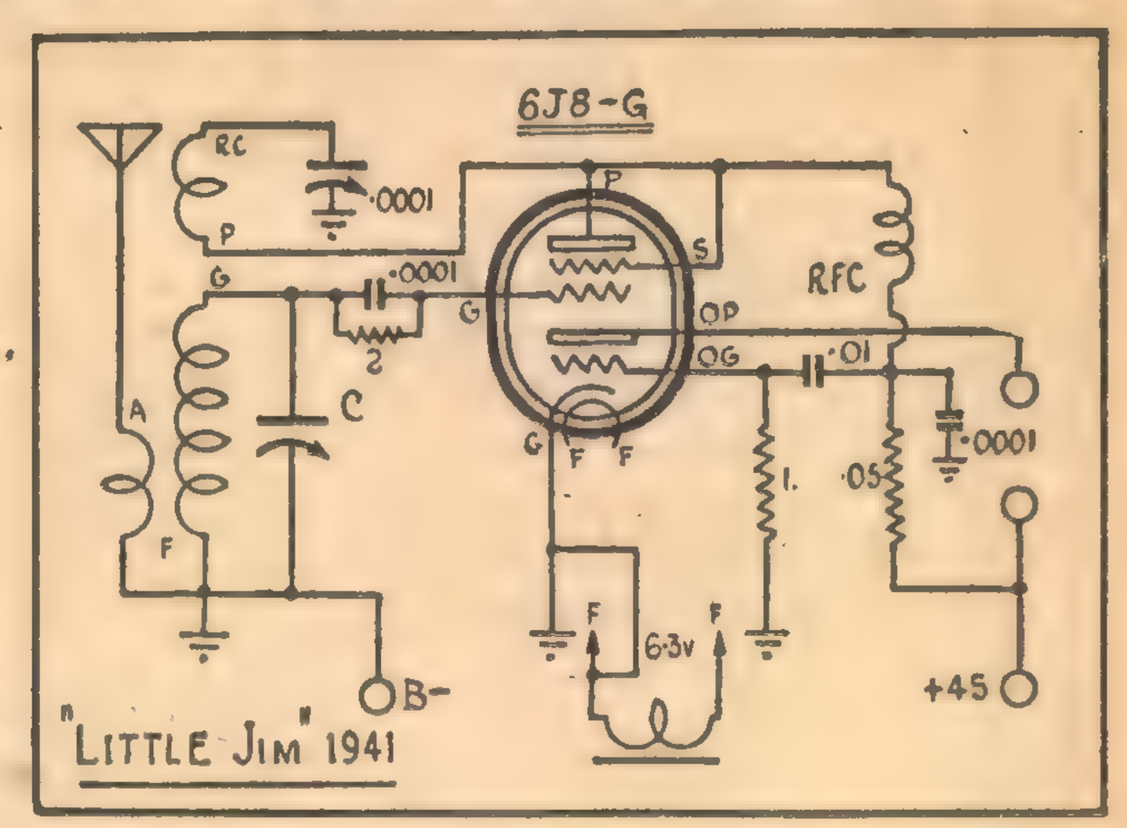
With a standard 385 volt power transformer, an 8in. speaker with a 2500 ohm field is suggested. For a midget speaker having about a 1500 ohm field, a 325 volt power transformer would be desirable. Current drain is about 50 milliamps.

Almost any of the ordinary twin triodes could be substituted for the 6C8-G. For high-mu types such as the 6A6 the cathode bias resistor could well be reduced to 1000 ohms. Where the valve has a single cathode connection, return the 2 meg. grid resistor to the cathode pin instead of to the top of the coil.



TWO VERSIONS OF "LITTLE JIM"





be used, as desired. If using a commercial coil, buy the well-known Reinartz type, using the aerial primary as shown for "Little Jim" for 1941. For coil winding data for home construction, refer to page 53.

There is a certain fascination about one-valve sets—a fascination which does not pass, even after one has been used to larger receivers. A one-valve set constitutes a challenge, because it must be made to operate at the peak of efficiency. Because of cheapness and the simplicity of actual construction, such a receiver is also the logical starting point for a beginner.

The two circuits on this page are one-valve receivers in the sense that there is only one valve to be seen. However, in both cases the valve specified has a dual internal structure and is so connected into the circuit that it functions as two separate valves. One section acts as the regenerative detector and the other as an audio amplifier.

THE CIRCUITS

"Little Jim," using the 6A6, was described in the very first issue of "Radio and Hobbies"—April, 1939. Electrical equivalents of the 6A6 are the 6N7, 6N7-G, and the 53, which has a 2.5-volt heater.

"Little Jim" for 1941, described in the February, 1941, issue, uses the 6J8-G converter valve, but gives much the same results as the earlier circuit.

In both cases it is suggested that the heater be operated from a suitable filament transformer, taking the high tension from a single 45-volt B battery. High tension current drain is very small, and a battery should last quite a long time. Use of a battery simplifies matters considerably, as it is not very convenient to arrange a suitable a-c power supply for a single valve receiver with the components now available.

Commercial or home-made coils may

RESISTOR & CONDENSER COLOR CODES

For several years carbon resistors commonly used in Australia have been color coded according to a standard laid down by the Radio Manufacturers' Association (USA). The ohm is the basic unit of the code. The main body color of the resistor denotes the first digit in the resistance value. The end color denotes the second digit, and the color of the dot or band the number of noughts following the first two figures.

Significance of the colors used in the code are as follows:—

Black	0	Green	5
Brown	1	Blue	6
Red	2	Violet	7
Orange	3	Grey	8
Yellow ...	4	White	9

Thus, if one comes across a resistor with a green body, a black end and a yellow dot, the resistance value can be written down as follows:—

For the green body, write down the digit 5. The end comes next and, being black, denotes the digit 0, so that the number becomes 50. The dot or band is yellow, so that four ciphers or noughts have to be added to the right of the existing number; the result is 500000—500,000 ohms or 0.5 meg.

Obviously, the code can only be used to denote two significant figures ahead of the ciphers, but this is usually sufficient. Values such as 125,000 ohms are often coded as 120,000 ohms, the third significant figure being dropped.

An additional gold band indicates a tolerance of plus or minus 5 per cent. A silver band plus or minus 10 per cent., no band plus or minus 20 per cent.

The following table sets out the color codes of the most commonly used resistors. Note, however, that wire-wound resistors are seldom coded, the value being marked on directly.

Resistance in ohms	Body Color	End Color	Dot Color
50	Green	Black	Black
100	Brown	Black	Brown
150	Brown	Green	Brown
200	Red	Black	Brown
250	Red	Green	Brown
300	Orange	Black	Brown
350	Orange	Green	Brown
400	Yellow	Black	Brown
450	Yellow	Green	Brown
500	Green	Black	Brown
750	Violet	Green	Brown
1,000	Brown	Black	Red
1,500	Brown	Green	Red
2,000	Red	Black	Red
2,500	Red	Green	Red
3,000	Orange	Black	Red
3,500	Orange	Green	Red
4,000	Yellow	Black	Red
4,500	Yellow	Green	Red
5,000	Green	Black	Red
6,000	Blue	Black	Red
7,000	Violet	Black	Red
8,000	Grey	Black	Red
9,000	White	Black	Red
10,000	Brown	Black	Orange
12,000	Brown	Red	Orange
13,000	Brown	Orange	Orange
15,000	Brown	Green	Orange
17,000	Brown	Violet	Orange
18,000	Brown	Grey	Orange
19,000	Brown	White	Orange
20,000	Red	Black	Orange
22,000	Red	Red	Orange
25,000	Red	Green	Orange
27,000	Red	Violet	Orange
30,000	Orange	Black	Orange
35,000	Orange	Green	Orange
40,000	Yellow	Black	Orange
45,000	Yellow	Green	Orange
50,000	Green	Black	Orange
60,000	Blue	Black	Orange
70,000	Violet	Black	Orange
75,000	Violet	Green	Orange
80,000	Grey	Black	Orange
90,000	White	Black	Orange
100,000	Brown	Black	Yellow
125,000	Brown	Red	Yellow
150,000	Brown	Green	Yellow
175,000	Brown	Violet	Yellow
200,000	Red	Black	Yellow
225,000	Red	Red	Yellow
250,000	Red	Green	Yellow
275,000	Red	Violet	Yellow
300,000	Orange	Black	Yellow
350,000	Orange	Green	Yellow
460,000	Yellow	Black	Yellow
450,000	Yellow	Green	Yellow
500,000	Green	Black	Yellow
600,000	Blue	Black	Yellow
750,000	Violet	Green	Yellow
1 meg.	Brown	Black	Green
1¼ meg.	Brown	Red	Green
1½ meg.	Brown	Green	Green
1¾ meg.	Brown	Violet	Green
2 meg.	Red	Black	Green
2¼ meg.	Red	Red	Green
2½ meg.	Red	Green	Green
3 meg.	Orange	Black	Green
4 meg.	Yellow	Black	Green
5 meg.	Green	Black	Green
10 meg.	Brown	Black	Blue

NEW RMA CODE FOR RESISTORS

THE RMA has adopted as standard a new method of color marking resistors. The method has not yet been adopted universally in Australia, but is set out for purposes of reference.

Under the older and more usual system, first and second digits and the number of ciphers to be added is indicated respectively by the color of body, end and spot.

Under the new standard, the body color has no particular significance, but three or four color bands are arranged about one end of the resistor. Hold the unit so that the bands are on the left. First band on the left indicates the first digit, second indicates the second digit, third the number of ciphers to be added. Colors have precisely the same significance as before.

A fourth band of gold indicates a tolerance of 5 per cent.; one of silver indicates a tolerance of 10 per cent.; no additional band indicates a tolerance of 20 per cent.

COLOR CODE FOR FIXED CONDENSERS

AS for resistors, so also is there a standardised color code for condensers. However, usual Australian practice is to stamp the capacitance on to the body of the unit. Capacitance may be found marked either in terms of microfarads or micromicrofarads without indication as to which unit is employed. There is little risk of confusion.

To convert micromicrofarads to microfarads (uuF. to uF.), divide by 1,000,000.

Basic unit for the RMA color code for condensers is the micromicrofarad, and the color dots are arranged to denote so many micromicrofarads of capacitance. Individual colors have the same significance as for resistors.

The brand or other printing on the body of the condensers will usually give the key as to which way to hold the condenser to read the color code.

First dot indicates the first digit in the capacitance value; second dot indicates the second figure; last dot on the right indicates the number of ciphers to be added. Thus, red—green—brown, indicates 250 uuF. or .00025 microfarad.

Where the value calls for three significant figures, the third may be dropped as in the case of resistors. Alternatively there may be five recesses in line for color blobs. From left to right, the first two indicate the first two significant figures; the third position is left blank; the fourth color indicates the third significant figure, and the fifth the number of ciphers to be added.

The R.M.A. code also makes provision for indicating the tolerance and the votlage rating. These markings are seldom encountered in Australian components. For complete information, see the "Radiotron Designer's Handbook."

Values in micromicrofarads.

First Dot	First Digit	Second Dot	Second Digit	Third Dot	Remaining Digits
Black	0	Black	0	Black	-
Brown	1	Brown	1	Brown	0
Red	2	Red	2	Red	00
Orange	3	Orange	3	Orange	000
Yellow	4	Yellow	4	Yellow	0000
Green	5	Green	5	Green	00,000
Blue	6	Blue	6	Blue	000,000
Violet	7	Violet	7	Violet	0,000,000
Grey	8	Grey	8	Grey	00,000,000
White	9	White	9	White	000,000,000

As the festive season draws near, with its traditional sentiments of Goodwill, we would like to take this opportunity of expressing our grateful thanks to all our good friends who have supported us during the last twelve months and to hope that the coming year will be the commencement of a new era in which Peace and Prosperity will go hand in hand.

ALL THE BEST!

KEEP 'EM LISTENING

Make that your motto for the duration.

It's of vital importance to the war effort to "keep 'em listening," and we make a special appeal to Radio Dealers, Servicemen and Home Constructors to co-operate in every possible way with our Authorised Distributors. In spite of many wartime restrictions we at Crown Radio Products are doing our utmost to ensure a constant supply of modern replacement component parts, and we feel sure that you will make allowances should any hold-ups occur.

Crown Radio Products have for years given you a "Reliable Line" of standardised replacement parts and, realising the necessity of maintaining the efficiency of existing radio receivers, we ask you to assist us by your valuable co-operation and service to

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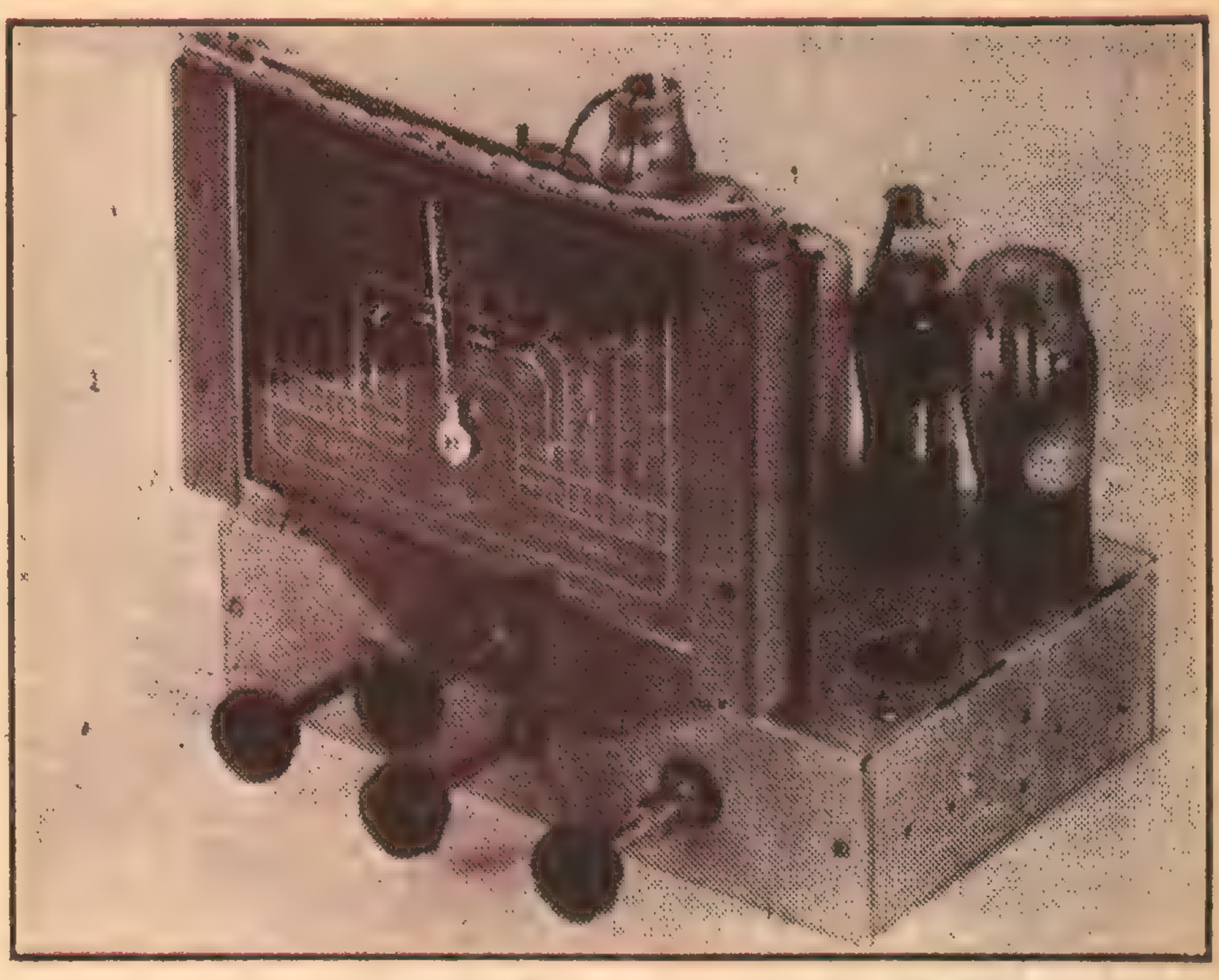
1942 PENTAGRID FOUR BATTERY SET

Designed around the popular 2.0 volt series of battery valves, this particular receiver is one of the best four valvers we have ever described. The circuit is entirely up-to-date and combines efficiency with economy of operation. For full description of the receiver, see the March 1942 issue.



THE original receiver was designed particularly for broadcast band operation. Built up with first quality coils and I-F transformers, it has a high degree of selectivity and sensitivity, and therefore can be used in all but difficult country districts.

Naturally, the receiver has not the performance of a good five-valve job with an R-F stage, but it dill do as well and better than any other similar four-valver. If four-valve receivers are a success in your district, you can rest assured that this one will give a good account of itself.

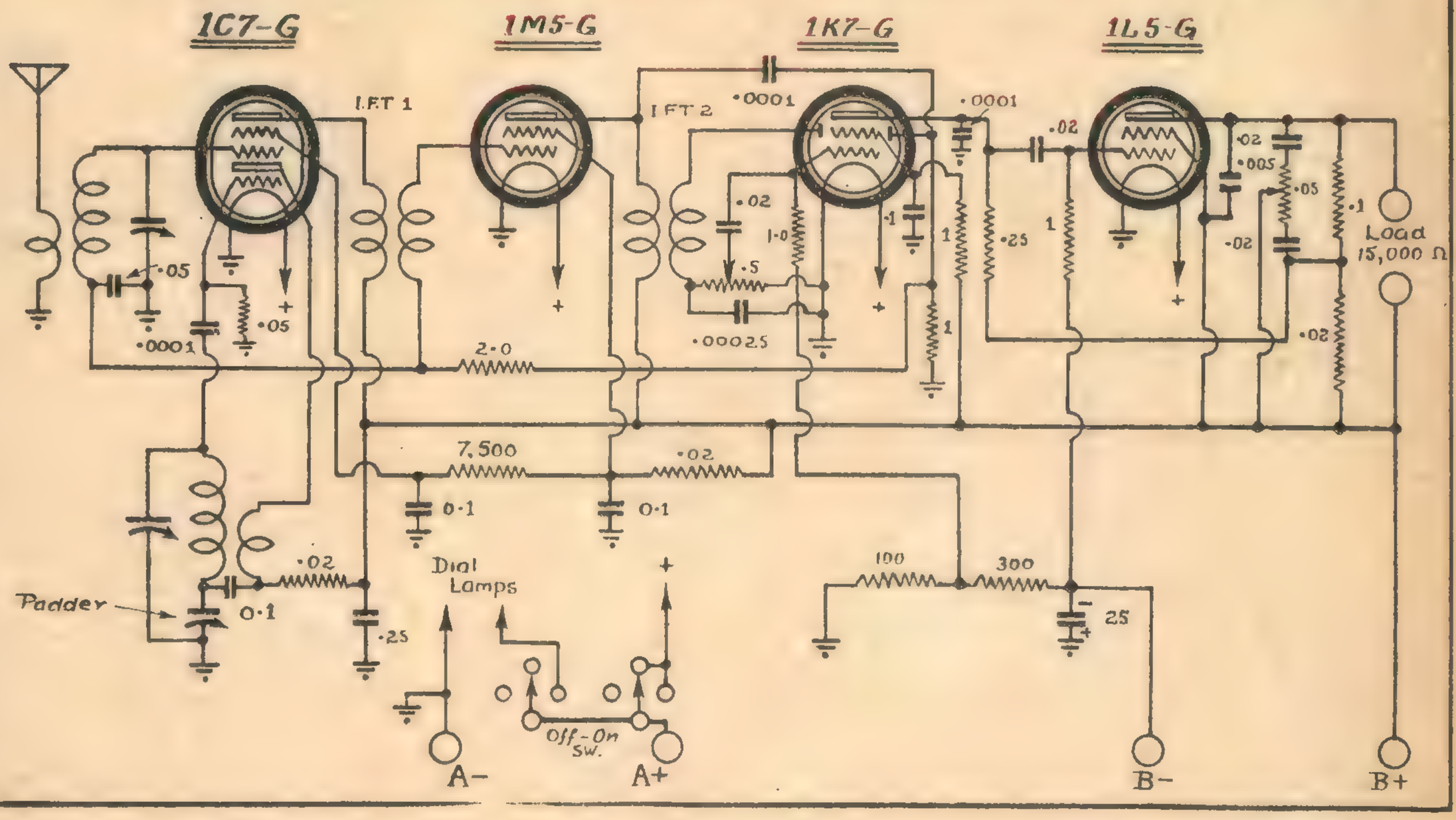
If your district is a notoriously bad one, go for something bigger—a receiver with an R-F stage. Here let us whisper that we have a larger circuit ready for publication almost immediately.

Amongst other things, the 1942 Pentagrid Four features padder feedback, automatic bias, negative feedback and a system of tone control permitting the treble to be attenuated or accentuated at will. Dial light switching is provided and there are only four connections to be made to the batteries.

"A" battery current drain is 0.6 amp. at 2.0 volts. "B" battery current drain under typical conditions is about 12 milliamps at 135 volts.

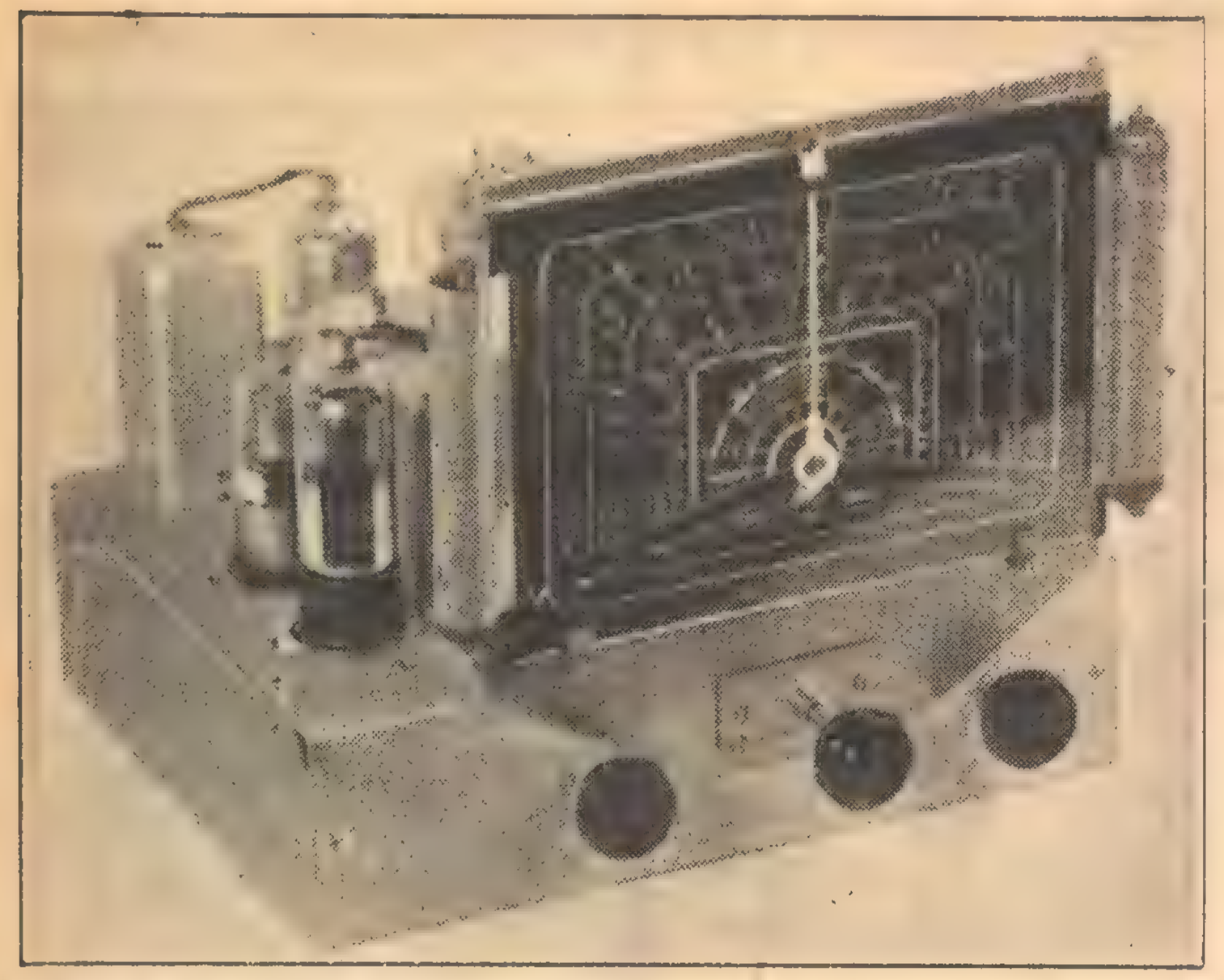
Valve equivalents are as follow: 1C7-G, 1C6; 1M5-G, 1C4; 1K7-G, 1K6; 1L5-G, 1D4; Type 1D5-GP or 1A4-P may be used in place of the 1M5-G I.F. amplifier.

R&H 1942 PENTAGRID FOUR



REVIEW

USES 1.4v VALVES—THE 1940 PENTAGRID



Despite the fact that 1.4-volt series of valves has not shown up too well in the matter of reliability, they have the undoubted advantage of economy of operation compared to other types. This fact, together with their small physical dimensions, makes them particularly adaptable to portable receivers. At the moment, however, 1.4-volt valves generally are particularly scarce, owing to military demands.

TWO versions of the 1940 Pentagrid Four were described in "Radio and Hobbies." The broadcast version was described in May, 1940, and the dual wave version in the June issue. The same general circuit is used for both, the dual-wave version being equipped with a suitable coil box.

The receivers, as described, were intended for home use, being built up on an ordinary chassis with controls and dial arranged to fit into a console cabinet. By using a smaller chassis and adopting a compact layout, the receiver could be built up as a portable set. For this purpose, the broadcast version would be most suitable, a loop aerial taking the place of the aerial coil.

Success on the shortwave band depends on obtaining a converter valve in reasonably good condition and on using a coil kit designed for the 1A7-GT, or at least for a battery converter valve. General purpose coil kits work quite well with a-c converter valves, but are seldom satisfactory on the short-wave band the 1A7-GT. The 1B7-GT is a better proposition in this regard, but is not available at the moment.

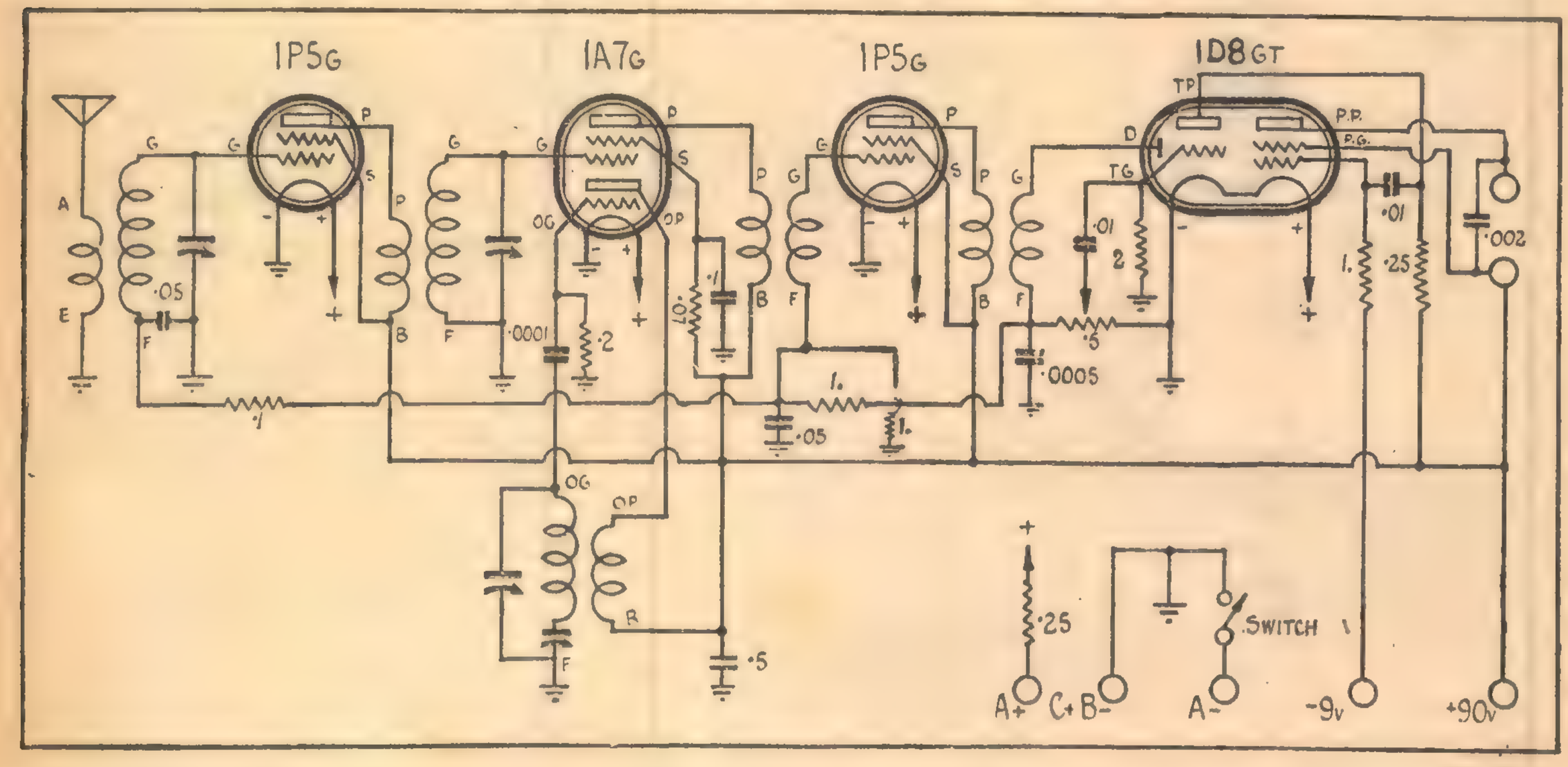
R-F STAGE

The circuit incorporates an R-F stage ahead of the converter valve, thus ensuring adequate gain and low noise level. For satisfactory results, it is desirable to use modern tuning coils, and essential to use the best possible I-F transformers.

The last valve is the three-in-one type 1D8-GT, which combines in one envelope the functions of diode detector, audio voltage amplifier and pentod output. The receiver is therefore the equivalent of an ordinary five-valver.

Batteries required are two 45-volt B batteries, one 9-volt C battery, and a 1.4-volt dry cell for the A supply. The 0.25 ohm resistor in series with the filament circuit serves to limit the voltage applied to the filaments of the valves when the A battery is fresh. This should not be eliminated unless the lead is sufficiently long to have equivalent d-c resistance.

Current drain under average conditions is about 10 milliamps from the B batteries, 0.25 amp. from the A battery, with no drain from the C battery.



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Here are a few extracts from the letters of past students of the Australian Technical Schools. These letters speak for themselves!

(a) "Thanks to your technical training in Motor Engineering, I have a good position as Chief Mechanic on a station."
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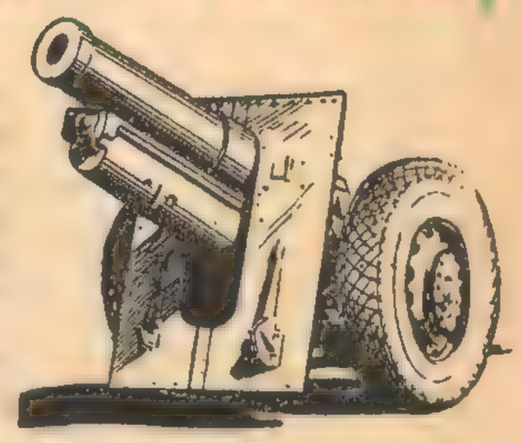
(c) "Since taking the Motor Engineer's Course I have been appointed Service Manager for the International Harvester Co. I thank you."
(d) "Before I enrolled I was breaking stones—now, thanks to you, I have a position as a Motor Mechanic."
(e) "I must thank you for helping me. Since getting my certificate my wages have been over £8 per week."
(f) "I was recently appointed Chief Engineer to a Factory and Trading Co. The plant includes 5 Diesels and 4 Electric Generators."
(g) "I passed my exam. after taking your Course in 1931. For the past nine years I have never been out of work. I now draw £18/9/- every fortnight (Diesel Driving)."
(h) "I am writing to let you know that I passed my Engine Driver's Exam. This was through your tuition and training."

Qualified Engineers are in demand—To-day



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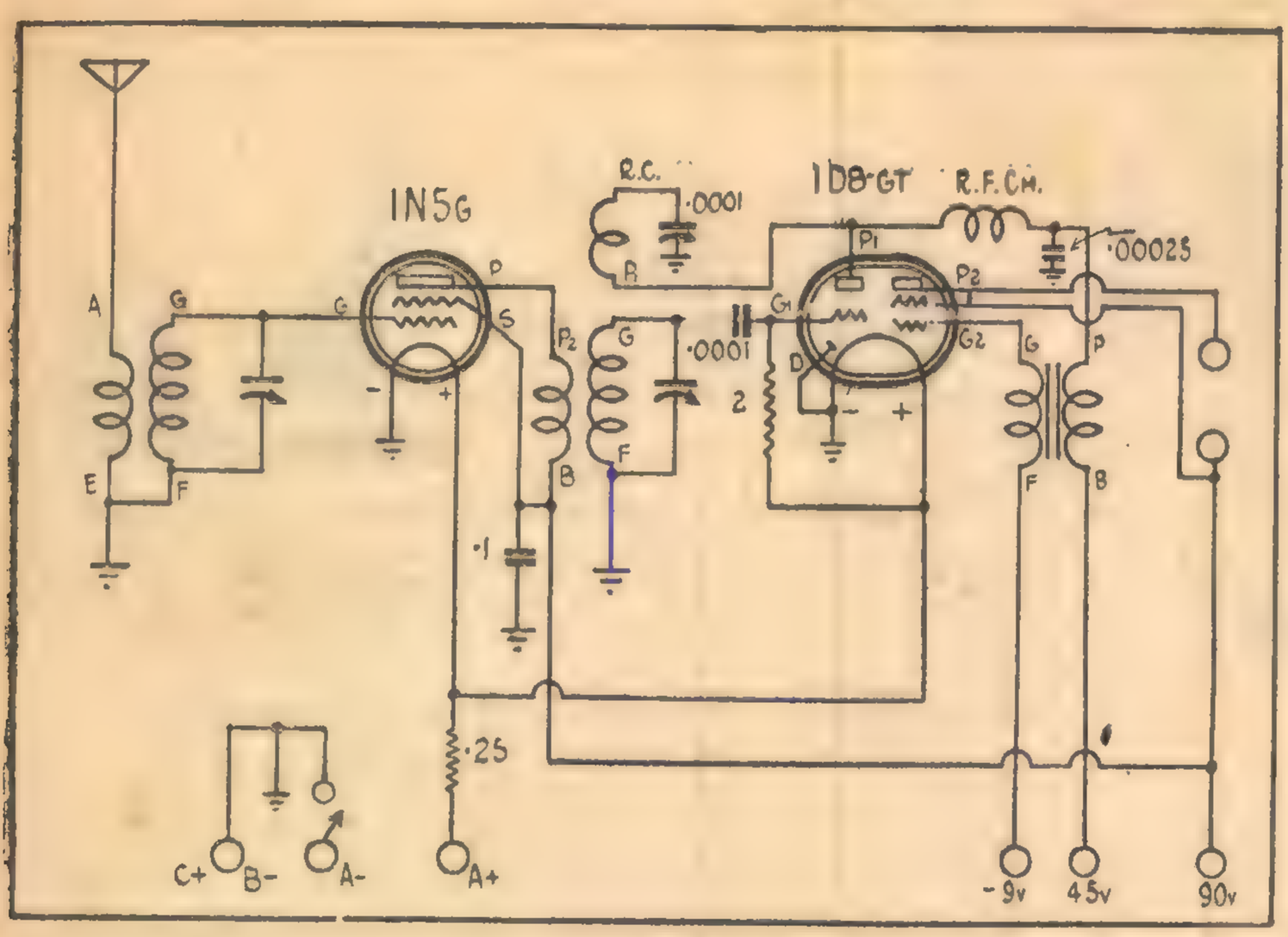
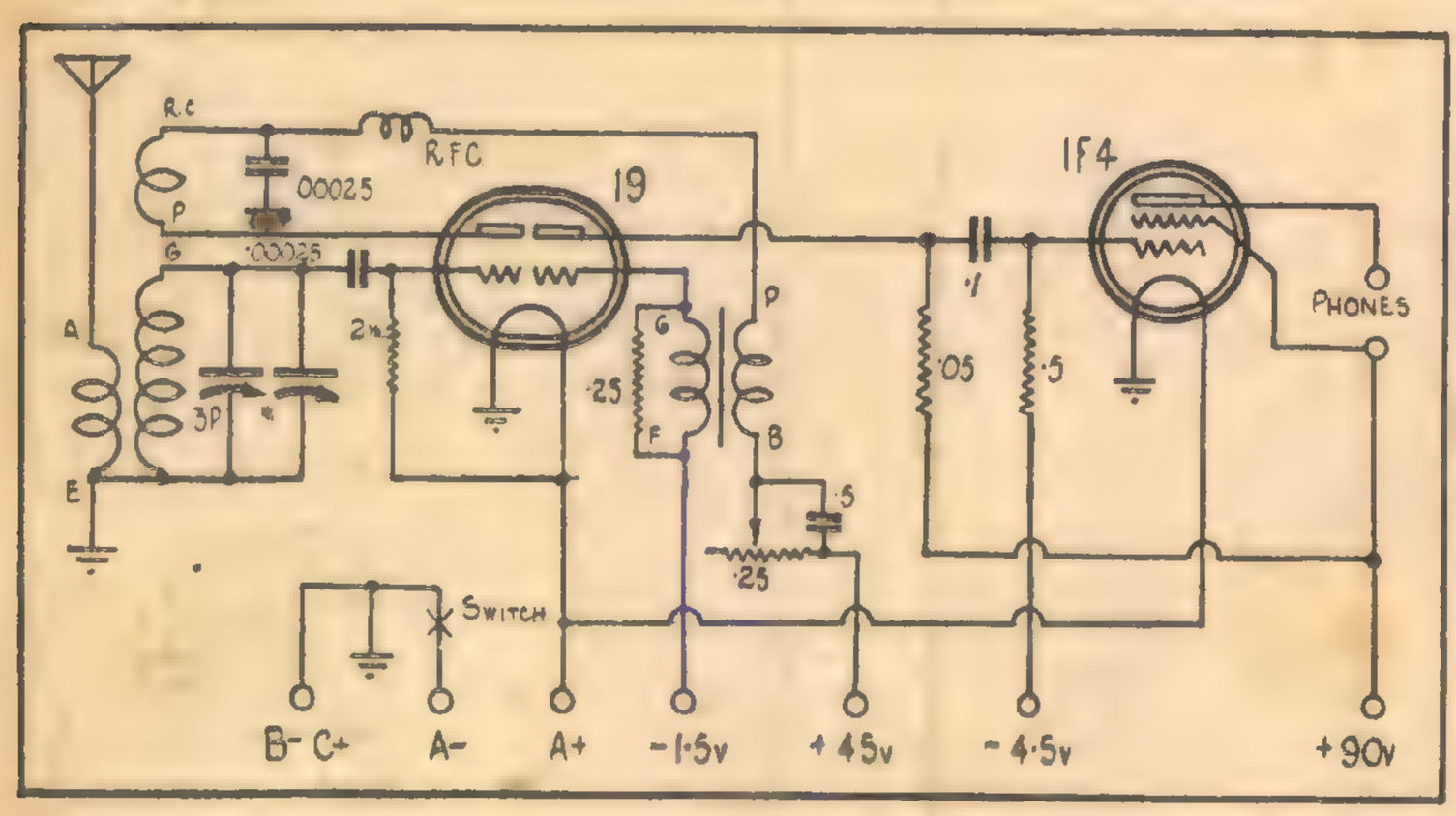
REVIEW

A PAGE FOR THE SMALL SET ENTHUSIAST





Small battery sets have an appeal, not only to enthusiasts in the country, but to city dwellers who want a little job not dependent on connection to the power mains. Nowadays there is still another demand — that from soldiers and airmen who want a "cigar-box" receiver to give them headphone reception while off duty in camp.

HERE is a group of circuits capable of meeting the needs of any one of the three categories. Each receiver is really larger than it might appear, in that each one incorporates a dual valve performing more than one task.

LITTLE JIM'S MATE

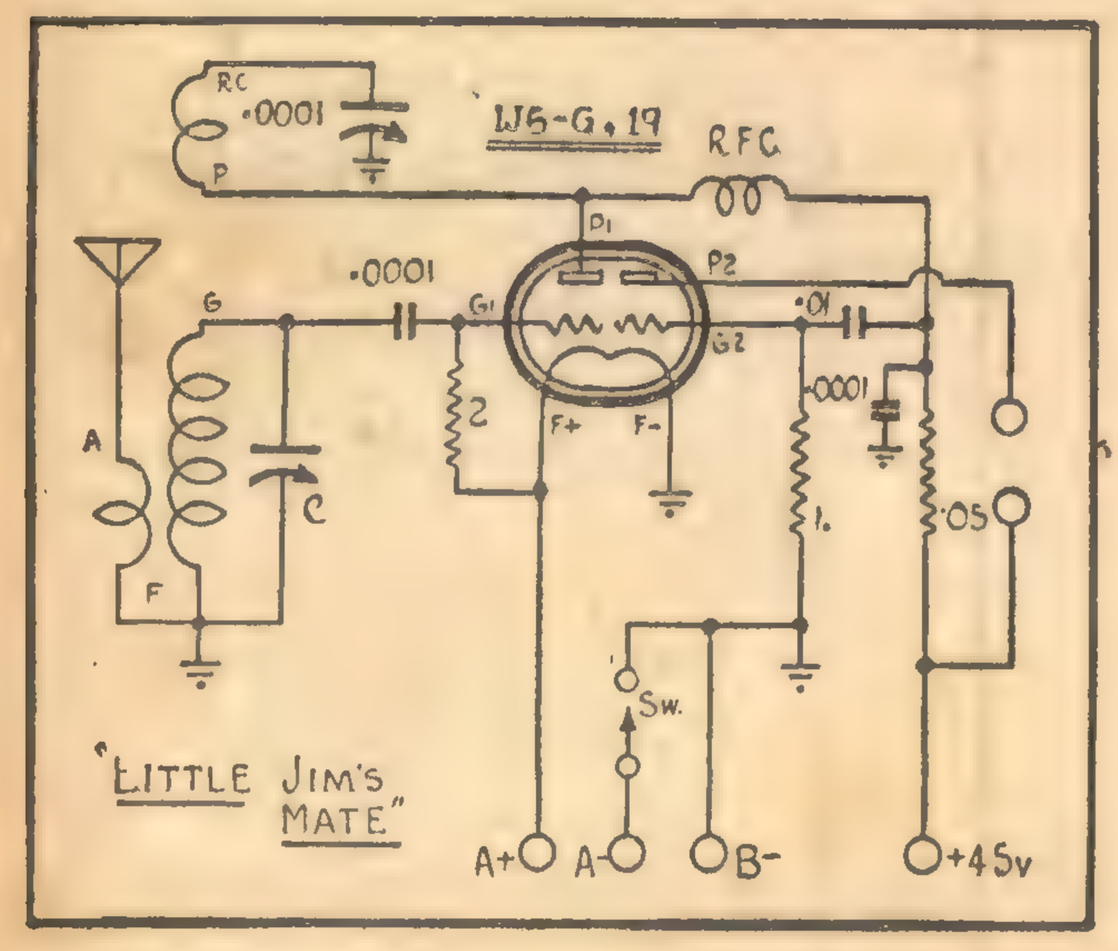
At the bottom of the page is the circuit of Little Jim's Mate, using a 19 or a 1J6-G valve. This receiver was originally described in "Radio and Hobbies" for May, 1939.

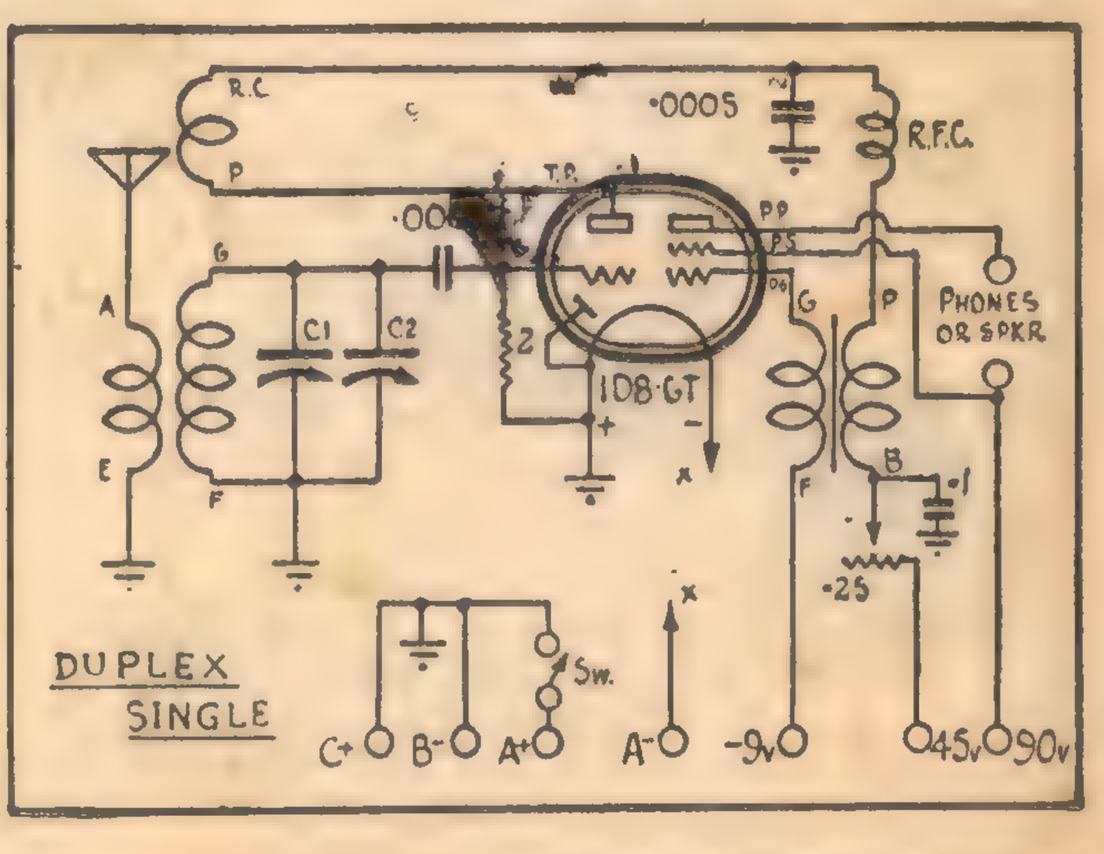
For headphone reception, it would be difficult to imagine anything simpler or more reliable. The 19 valve is quite robust and able to take a lot of punishment in the matter of handling. Two batteries are required, one to supply the filament and a 45 volt B battery for the high tension supply.

The 19 filament should really be supplied from a 2.0 volt accumulator, but the original receiver operated quite satisfactorily with the filament supplied from a single 1.6 volt dry cell. Filament voltage will have a slight effect on the adjustment of the reaction circuit.

High tension current drain is only a milliamp or so. A-battery drain is about 0.25 amp at 2.0 volts and something less than 0.2 amp with a 1.4 volt supply. With ordinary use, batteries should last for quite a long time.

Little Jim's Mate has insufficient power output to operate a loudspeaker





satisfactorily, although it is excellent with headphones. More gain may be had, with some increase in weight and size, by using transformer coupling between the two triode sections. Any small step-up transformer having a ratioo of between, say, three and five to one would serve the purpose.

SECOND CIRCUIT

Elsewhere on the page is the circuit of a two-valve receiver using a 19 and a 1F4. The first section is somewhat similar to Little Jim's Mate, although a different method of reaction control is used, together with transformer coupling is shown. For use in the vicinity of strong stations, an audio volume in the grid circuit of the 19 amplifier stage would be an advantage. By advancing the reaction control to the point of oscillation and turning down the volume control, if necessary, best selectivity is obtained.

Either a 19 or 1J6-G can be used in the first stage and, in the second, possible types are 1F4, 1F5-G, 1D4 and 1L5-G. High tension current drain is no more than a couple of milliamps under the conditions shown. Output is sufficient to work a small speaker on strong stations; for this purpose the bias on the output valve could well be decreased to —3.0 volts.

THE DUPLEX SINGLE

The Duplex Single is built up around the 1.4 volt type, 1D8-GT, and is capable of outstanding results for a one-valver. It is excellent on phones and, on strong stations, output is sufficient to operate a small speaker.

Main disadvantage is that the 1D8-GT is rather expensive to buy and less reliable than the 19 used in "Little Jim's Mate." A further point is that the high tension current drain is about 5mA at 90 volts and the circuit calls for a C battery. However, for purely headphone use, a single 45 volt B battery would serve quite well and the bias could be kept fairly high to keep down the current drain.

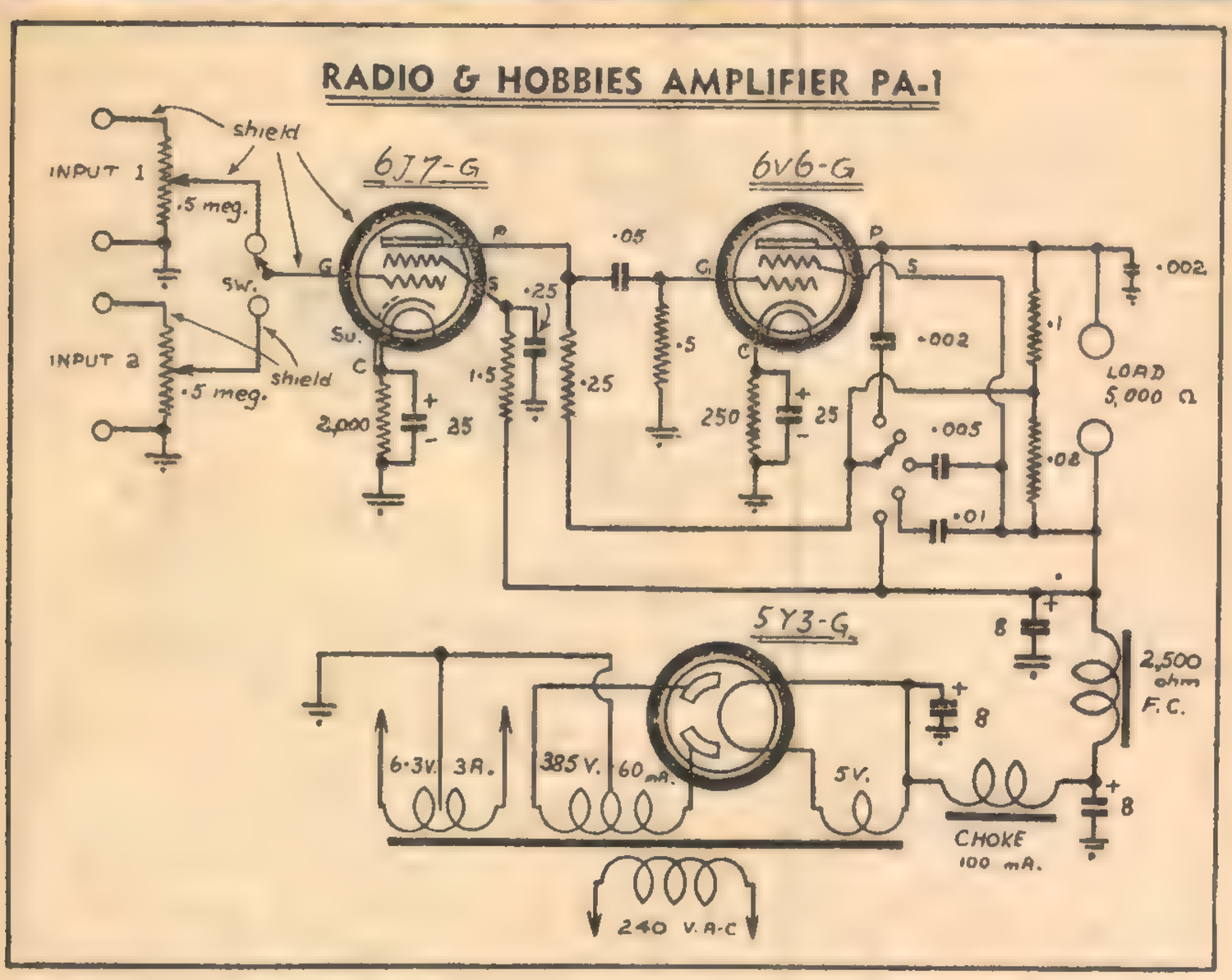
The Duplex Single was described in "Radio and Hobbies" for Christmas, 1939.

TINY TWO

Described in the April, 1940, issue, the Tiny Two is an elaboration of the Duplex Single. For its size, this little job puts up a remarkable performance. With a good aerial and earth and carefully adjusted, it will give good loudspeaker reception of all the stronger stations. In the vicinity of a strong station, it would be an advantage to arrange a gain control for the R-F stage, either by varying the screen voltage or applying a bias to the control grid. This would permit the reaction to be used to advantage in the interests of selectivity.

Any of the first three receivers may be used for short-wave reception simply by winding up suitable short-wave coils and plugging them in. In the case of the Tiny Two, considerable care would be necessary to get the aerial and R-F coil to track properly. For coil data, see Page 43.

A SELECTION OF AMPLIFIER CIRCUITS



During 1942 we described quite a number of amplifiers intended for use in the home, at parties and socials and at small patriotic gatherings of the type held so frequently just now. Every one of the circuits has been built by readers, who have reported very favorably on their performance.

THE first of the circuits was designated as amplifier PA-1 and was fully detailed in the February, 1942, issue. It was built up on a specially cut chassis designed to mount this and other larger amplifiers.

Amplifier PA-1 has a power output of about 5 watts and, when used with an efficient loud-speaker, will supply music at ample volume for a medium-sized hall or a small outdoor gathering. Tonal quality is excellent, although this is governed largely by the nature of the loud-speaker and its associated baffle.

The circuit incorporates negative feedback for the output stage and a system of tone control giving arbitrary treble boost and cut. It also has provision for two input circuits, selected by a change-over switch.

Overall gain is insufficient for use with a low-level microphone, but the amplifier will provide useful output when used with a sensitive carbon or crystal type under close talking conditions. For use with most other microphones, an additional pre-amplifier stage is essential.

The speaker needs to have a 2500-ohm field coil, and should preferably be matched to a single 6V6-G. However, one matched to a single pentode, such as type 6F6-G, would work quite well in practice. Amplifier circuit PA-2, also described in the February, 1942, issue, is identical with PA-1, except that it uses a speaker with a 1000-ohm field coil.

In either amplifier, the 6V6-G specified may be replaced by a 6F6-G, 42, 2A5 or similar type by increasing the value of the cathode bias resistor to 400 ohms. The substitution would result in a slight loss of power output and overall gain.

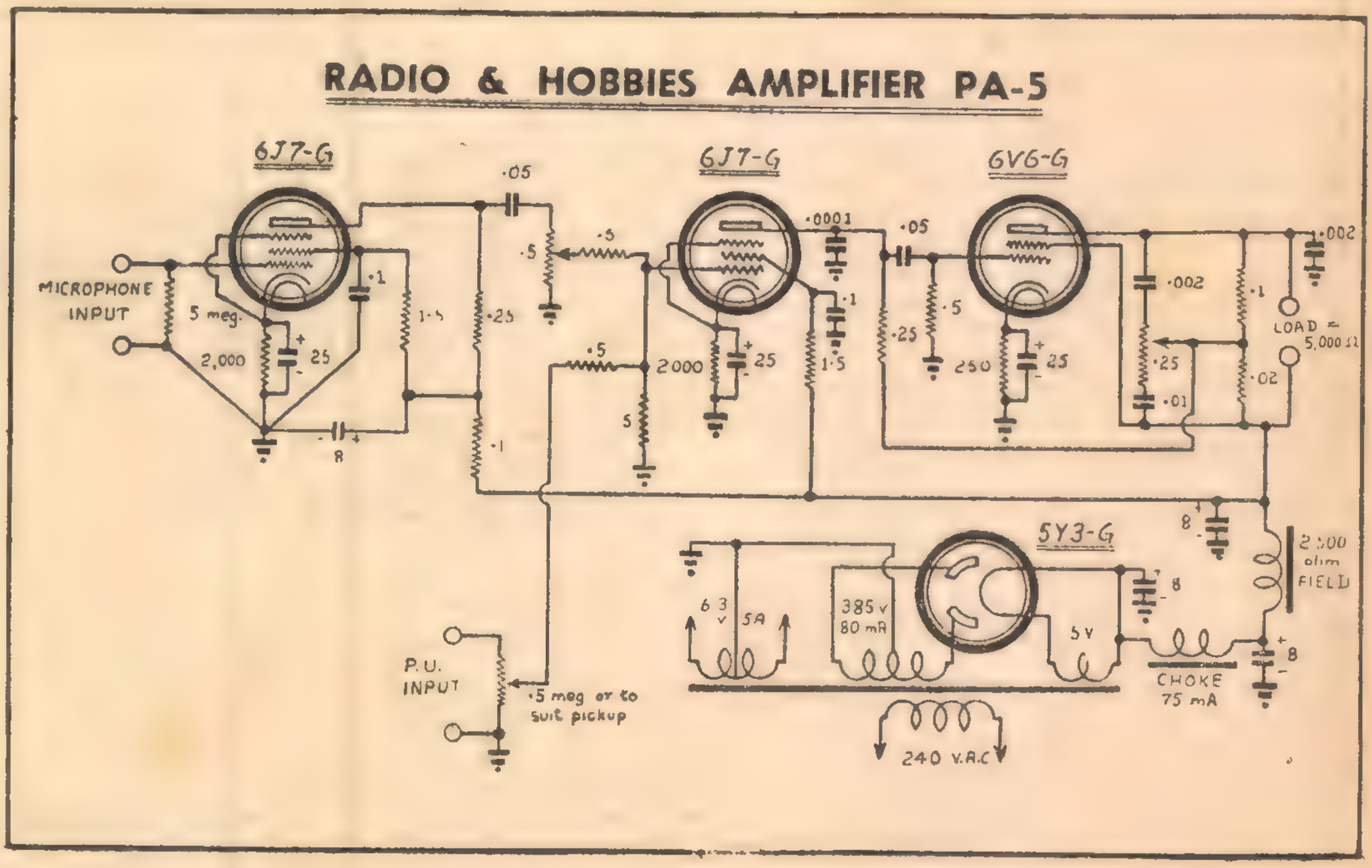
AMPLIFIER PA-5

In "Radio and Hobbies" for June, 1942, the subject of high-gain amplifiers was discussed and the circuit given for a triode and a pentode preamplifier stage. It was pointed out that increasing the gain above that normally provided for pickup amplification introduced certain difficulties, notably with hum and instability.

Readers who contemplate constructing a high-gain amplifier would be well advised to read this or other information on the subject.

In the same issue, two high-gain amplifier circuits were presented. The first of these, Amplifier PA-4, is essentially the PA-1 circuit with a triode preamplified stage. Also shown were the connections for a pentode preamplifier stage. Switching is retained for the selection of the desired input channel and also for purposes of tone control.

Amplifier PA-5, also described in the June, 1942, issue and reprinted on these pages, included certain refinements and has proved the more popular of the two. Most notable difference is in connection with the input circuit, where the switching has been eliminated and



a system of mixing substituted. Also, a continuously variable tone control is substituted for the switching arrangement.

Amplifier PA-5 is sufficiently versatile in control, and has sufficient gain and power output for small public address installations. Since being described, the original model has been tried out with marked success at socials, picnics, and small outdoor gatherings. Pickup used was an ordinary magnetic, and the microphone a sensitive high-impedance ribbon type.

TEN-WATT AMPLIFIER

In "Radio and Hobbies" for April, 1942, we described a rather novel 10-watt amplifier incorporating push-pull output, negative feedback, and continuously variable tone control.

Main feature of the circuit is the method of exciting the grid of the second output valve from the screen circuit of the first. We tried the scheme out thoroughly before publishing the circuit. Favorable reports from many readers indicate that the arrangement does not have any "snags" in practice.

The circuit, designated as Amplifier PA-3, does not incorporate a pre-amplifier stage, and is therefore not suitable for use with an ordinary low-output microphone. It has ample gain, however, for use with a pickup or with a high-output microphone under close talking conditions.

For use with less sensitive microphones, an additional preamplifier stage could be added, along the lines described in the June issue. Alternatively, the input circuit may be arranged exactly as for the PA-5 circuit.

The 6V6-G output valves may be replaced by type 6F6-G, 42, 2A5 or similar, by increasing the cathode bias resistor to 250 ohms, the series screen resistor to 2500 ohms, and the plate-to-plate load to 14,000 ohms. (See the TRF Quality Six receiver.)

BATTERY AMPLIFIER

In our November, 1942, issue, we described a battery-operated amplifier for the benefit of country readers. The design brought to light many problems, but the circuit finally evolved is reprinted on this page.

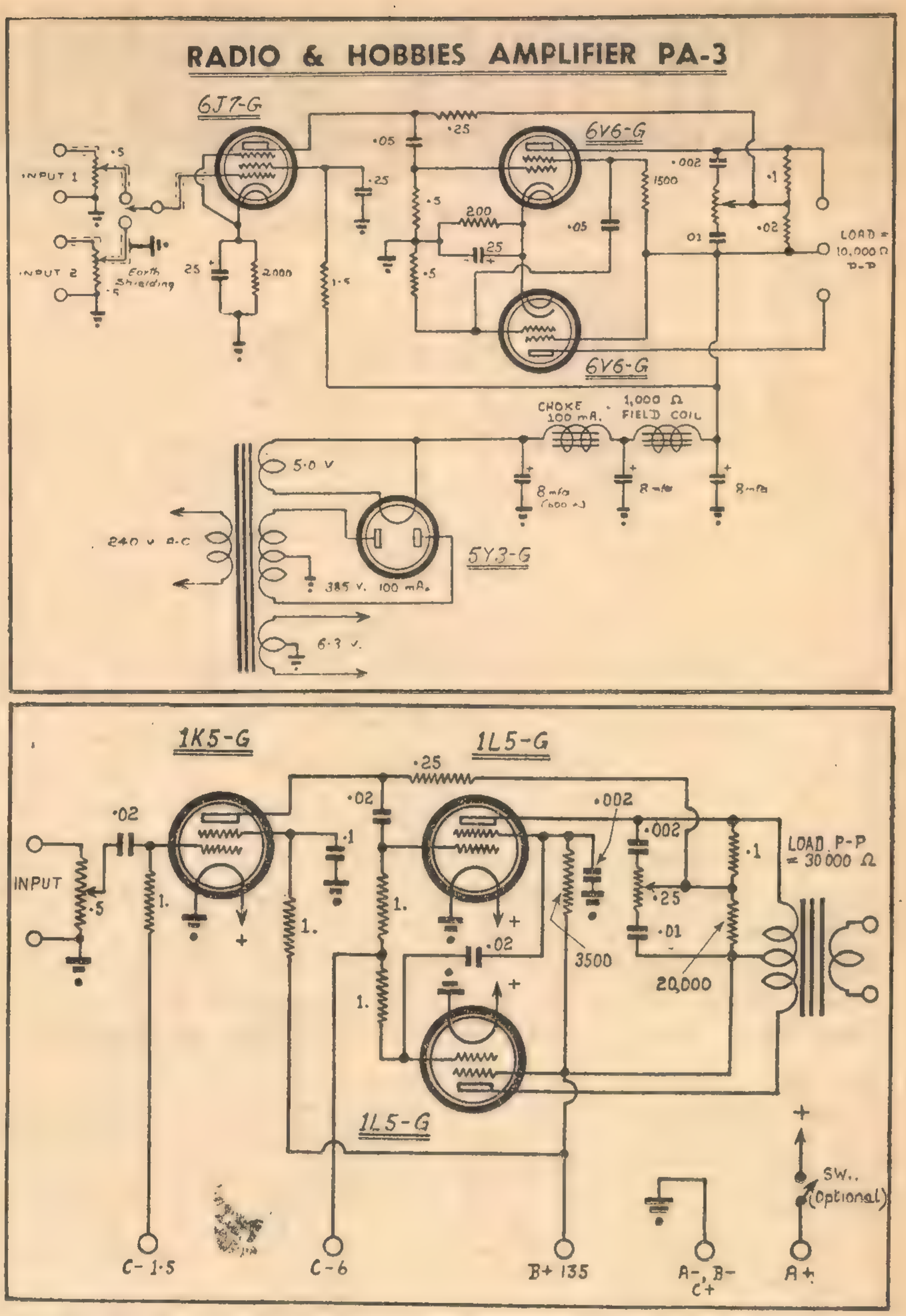
It employs a 1K5-G as a voltage amplifier; a 1K4 would serve equally well. Alternatively, the diode-pentode types 1K5 or 1K6-G could be used without change to the circuit and with only a very slight loss in overall gain.

The output stage uses push-pull type 1L5-G valves or their old-style equivalent, type 1D4. The system of negative feedback and tone control is similar to that employed in the PA-3 amplifier just described.

The amplifier is intended primarily for pickup amplification, and no provision is made for alternative input sources. However, a switch could be incorporated, if necessary, as in the input circuit of PA-1.

Over-all gain is ample for pickup amplification or for a high-output microphone under close talking conditions. For low-output microphones, an additional stage would be necessary. However, it must be remembered that the power output of the amplifier is limited and its value to reinforce speech not as great as with larger amplifiers.

Under the voltage conditions shown, power output is something less than a watt, but, with a sensitive loud-speaker, there is ample volume for a large room or small hall. High-tension current drain varies between 9 and 14 milliamps, with an average of about 12 milliamps at full volume.



CATHODE-RAY OSCILLOGRAPH

Many readers have made inquiries in regard to the recent articles on the Cathode-Ray Oscillograph. These were published in "Radio and Hobbies" for April, May and June 1942. The April issue set out the general theory and design of the instruments; the May issue covered the construction of a typical instrument using the 2in. type 902 tube; the June issue explained the typical applications for the completed article.

Increasing the C bias on the output valves to -7.5 volts practically halves the figures of current drain, with some deterioration of quality.

With a high-tension supply of 180 volts, output is better than 1.5 watts. With a bias of -9.0 watts, no-signal current drain is 8.6 milliamps, peak current drain about 19, and average at full volume about 14 milliamps. With a bias of -10.5 volts on the output valves, quality is not greatly affected, but the respective figures of current drain become 4.5, 17, and 7 milliamps. The latter figure of 7 milliamps for average current drain at full output is particularly good.

Quite a few readers have built up this amplifier and have reported very favorably on results, stating that it easily out-performs existing class B systems supposedly capable of delivering higher power output.

Possession of a good amplifier along these lines ensures entertainment on stormy evenings when the radio is silent because of static.

WORK OUT YOUR OWN MATHS PROBLEMS

Having just about completed the discussion of elementary mathematics likely to be required for the understanding of the later articles on alternating currents it may be wise to revise completely all the direct current formulae mentioned up to date before passing on to "conquer fresh fields."

SO now in this Christmas issue we intend to look back on those earlier articles and present a brief review of their salient points. Such a procedure will serve a twofold purpose, in that it will refresh our memories as well as providing a handy reference should it be necessary to refer back to a specific formula at some later date. It is much easier to remember one issue than to think of half a dozen or so.

FUNDAMENTAL UNITS

Before passing on to any particular formula, let us review the three main units found in any electrical circuit—that is, the volt (unit of potential), ampere (unit of current), and the ohm (unit of resistance).

The volt is the unit of electric pressure, sometimes referred to as the electro-motive force or potential difference, and this is generally denoted by the letter E. Larger or smaller units than the volt are in use, such as the kilovolt, equal to 1000 volts; the millivolt, equal to 1-1000th of a volt; and the microvolt, equal to 1-1,000,000 of a volt.

The ampere is the unit of current, and is defined as the value of current that flows through a resistance of one ohm with an applied E.M.F. of one volt. This ampere can be subdivided into smaller units—namely, the milliampere, or 1-1000th ampere, and the micro-ampere, or 1-1,000,000th ampere. The current in a circuit is usually designated by the letter I.

The opposition to current flow in a circuit is known as the "resistance" of that circuit, denoted by the letter R, and expressed in terms of ohms.

As with the volt and ampere, the ohm can be expressed in other units. For instance, if the resistance of a circuit is very high, then it may be more convenient to express it in terms of megohms, equal to 1,000,000 ohms.

At the other end of the scale we have the microhm, or 1-1,000,000th ohm, but this is rarely encountered, except in laboratory work.

So much for our basic units.

OHMS LAW

The most important and most frequently recurring law met with in radio work is Ohms Law, which gives the relationship between the voltage, current, and resistance in a circuit.

by C. E. Birchmeier

This law can be expressed in any of several forms, depending on whether the voltage, the current, or the resistance is the unknown factor. Thus if any two values are known in the circuit, the third can be determined by the use of the formula.

Now the first basic formula is

$$I = E \div R \quad \ldots\ldots\ldots\ldots (1)$$

From this the others are obtained by simple transposition, and so we find the second form is:

$$E = I \times R \quad \ldots\ldots\ldots\ldots (2)$$

while the third form is:

$$R = E \div I \quad \ldots\ldots\ldots\ldots (3)$$

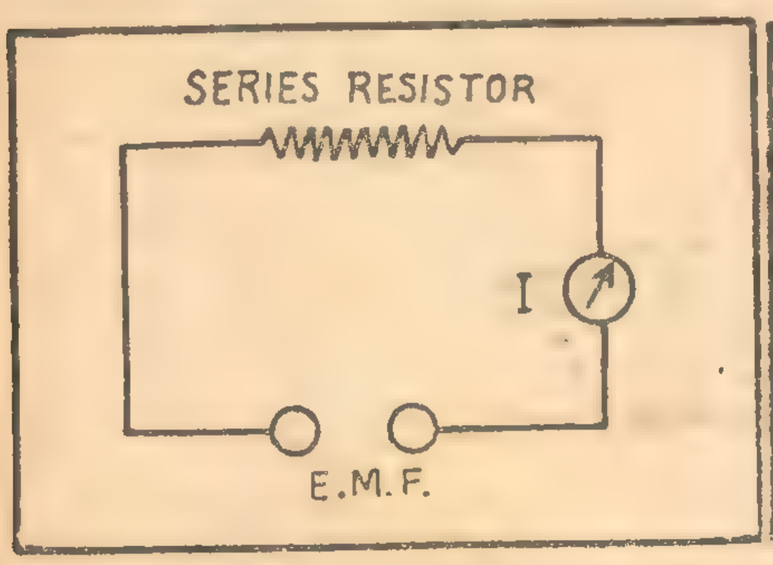


Figure 1. Ohm's law establishes the relationship between the voltage applied to a circuit, the resistance of that circuit and the current flowing. The formula may be transposed and modified to accommodate different units.

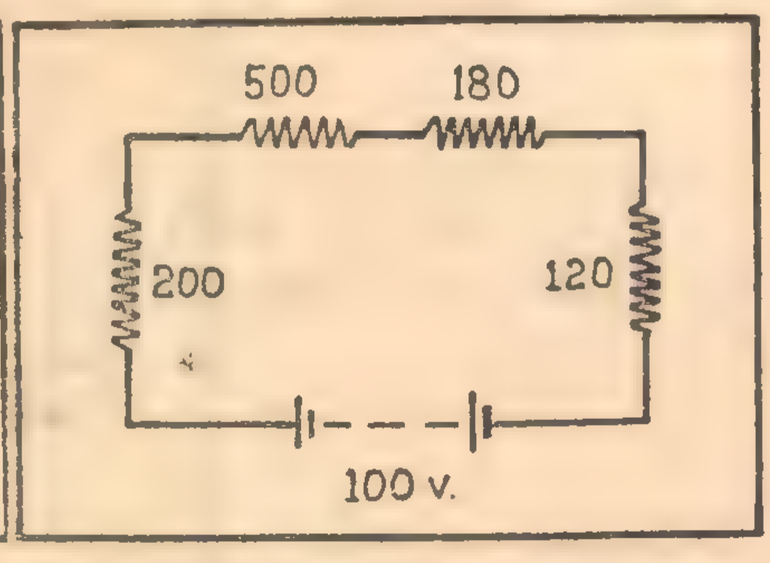


Figure 2. A typical series circuit involving four resistors. There is no limit to the number of units in such a circuit. Note that there is only one path for the current, which is the same in all parts of the circuit.

In each of these cases

E equals the potential of the E.M.F. in volts.

I equals the current in amperes.

R equals the resistance in ohms.

However, in cases where the various units are not expressed in these terms—and this frequently happens—these formulae must be amended. For instance, should the current be stated in milliamps, then the previously mentioned basic formulae will become:

$$I = 1000 \times E / R \quad \ldots\ldots\ldots (4)$$

$$E = I \times R / 1000 \quad \ldots\ldots\ldots (5)$$

$$R = E \times 1000 / I \quad \ldots\ldots\ldots (6)$$

You will notice that it is a matter of multiplying or dividing by 1000 depending on whether the current is stated or is required in milliamperes.

Then again, should the resistance be expressed in megohms with the current still in milliamps, and the E.M.F. in volts, the various formulae now become:

$$I = E / (R \times 1000) \quad \ldots\ldots (7)$$

$$E = I \times R \times 1000 \quad \ldots\ldots\ldots (8)$$

$$R = E / (I \times 1000) \quad \ldots\ldots (9)$$

You will realise there are other forms of these three basic formula, but we quote only the more commonly used ones. Once you understand these thoroughly, then it is quite easy to rearrange one of them for use with other units.

POWER FORMULAE

Closely allied to Ohms Law is the power or wattage formula, which allows the heat dissipated in a circuit, resistor, &c., to be determined. As in the case of Ohms Law, there are three basic formula, the first being:

$$P = E \times I \quad \ldots\ldots\ldots\ldots (11)$$

From this the other two can be determined thus:

$$P = I^2 \times R \quad \ldots\ldots\ldots\ldots (10)$$

$$P = E^2 \div R \quad \ldots\ldots\ldots\ldots (12)$$

in which

P equals the power or wattage dissipated.

E equals the applied E.M.F. in volts.

I equals the current in amperes.

R equals the resistance in ohms.

As before, the formulae change if the current and resistance are given in other units.

When the current is stated in milliamperes, with the E.M.F. in volts and the resistance in ohms:

$$P = E \times I \div 1{,}000 \quad \ldots\ldots\ldots (13)$$

$$P = \frac{I^2R}{1{,}000{,}000} \quad \ldots\ldots\ldots (14)$$

When the resistance is stated in megohms, with the E.M.F. in volts and the current in milliamperes:

$$P = \frac{E^2}{R \times 1{,}000{,}000} \quad \ldots\ldots\ldots (15)$$

$$P = I^2R \quad \ldots\ldots\ldots\ldots (16)$$

You will note that the last formula is the same as that quoted for the case

where the units are amperes and ohms. Should this puzzle you, just write out the formula in full, and then you will see that by cancelling out the result shown is obtained.

In addition to these, there are two other handy power formulae, and in many cases you will find them very useful. The first is:

$$I = \sqrt{P \div R} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (17)$$

and the second:

$$R = P \div I^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (18)$$

These, as you will notice, are just variations of our basic formulae, in that the subject of the equation has simply been transposed.

The former allows the maximum current carrying capacity of a resistor to be determined whenever the power rating in watts and resistance in ohms are known, while the latter is used to find the resistor value, when the wattage rating and current in amperes is known.

RESISTORS IN SERIES AND PARALLEL

In D-C circuits there are three basic circuits—namely, the series, parallel, and series-parallel networks.

The series circuit is one in which there is only one path for the current flowing, and so it follows that this current must be the same value in all parts of the circuit.

Should there be more than one resistance unit (this need not necessarily be a resistor, but can be any device offering opposition to the flow of direct current), connected in series, the total resistance is found by adding together the individual resistance values.

Thus we obtain the formula:

$$Rt = R1 + R2 + R3 \text{ .. \&c. .. .. .. (19)}$$

in which:

Rt equals the total resistance of the circuit.

R1, R2, R3, &c., are the individual resistance values.

Thus, in a circuit having four resistances of 200, 500, 180, and 120 ohms respectively, the total resistance will simply be the sum of these—that is, 1000 ohms (see Fig. 2).

Now, since the current in such a circuit is constant throughout, the voltage drop across any resistor can be determined by applying Ohms Law. Supposing the applied voltage is 100 volts; since we know the total resistance is 1000 ohms, the current flow must be 100 milliamps.

From this the individual voltage drops can be calculated, and these are 20, 50, 18, and 12 volts respectively. The sum of these voltage drops, you will notice, is equal to the applied voltage, and this provides an easy check on the calculations.

So we find in a series circuit: (a) The total resistance in the circuit equals the sum of the individual resistances. (b) The current in all parts of the circuit is the same. (c) The sum of the voltage drops across the resistances is equal to the applied E.M.F.

PARALLEL NETWORK

In the case of parallel circuits, the method of obtaining the resultant resistance is somewhat different. Here the reciprocal of a number is involved (that is, 1 divided by that number), and this makes the calculations rather more involved.

So we find the total resistance of a circuit containing a number of parallel resistors is obtained by taking the reciprocal of the sum of the reciprocals of all resistors in the network. Thus we have our formula:

$$\frac{1}{Rt} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3} \quad \ldots\ldots\ldots\ldots (20)$$

Here is an easy way to remember Ohm's law. Cover up the unknown quantity with your finger and the rest of the formula remains. If you want to find I, cover it up with your finger and you are left with E/R. with I x R.

Cover E and you are left

This gives the value of the reciprocal of R, so, when the answer is obtained it must be inverted in order to determine the value of R.

This may sound confusing, but the following example should help clear up matters. If a 50, 100, and 200 ohm resistor are connected in parallel, find the total resistance. (See Fig. 3.) Thus

$$1/R = 1 / 50 + 1 / 100 + 1 / 200$$
$$= 7 / 200$$

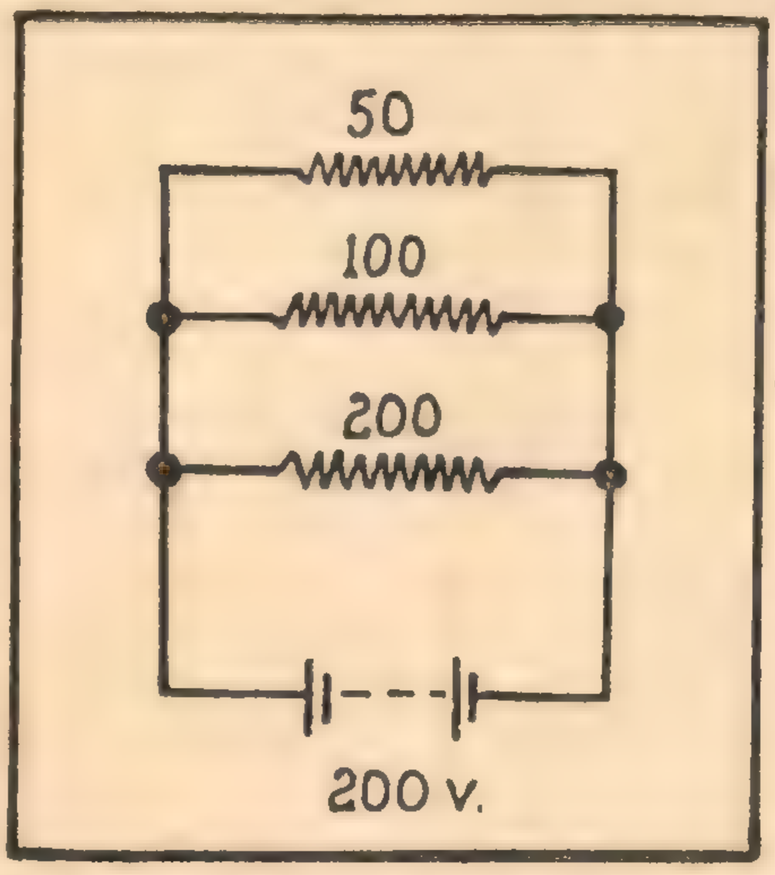


Figure 3. Here is a parallel circuit involving three resistors. It will be apparent that the full potential appears across each resistor; the current through each one is determined by its resistance value.

This gives the value of the reciprocal of R, so therefore R must equal 200 / 7 or 28.6 ohms approximately. You will note that the resultant resistance is less than the smallest resistor in the parallel network.

Now, should there be two or more EQUAL resistors connected in parallel, then the total resistance is more easily obtained from the following formula:

$$Rt = \frac{R}{N} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (21)$$

in which

Rt equals the total resistance of the circuit.

R equals the value of any one resistor in ohms.

N equals the number of equal resistors in parallel.

So, if we had two 20,000 ohm resistors in parallel, then the resultant value would be 20,000 divided by 2, or 10,000 ohms.

However, should we have two unlike resistors in parallel, then the formula to use is:

$$Rt = \frac{R1 \times R2}{R1 + R2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (22)$$

That is, the product of the two resistors is divided by their sum in order to find the total resistance. When only two resistors are involved you will find it much easier to use this formula than the more cumbersome one mentioned earlier.

DIVISION OF CURRENT

In contrast to the series circuit, we find in a parallel circuit that the same voltage acts on the resistances, but the total current is divided between the various branches.

So, if the applied voltage is 200 volts in Fig. (3), then the current in each branch can be determined by dividing the voltage by the resistance in ohms of that branch. Working this out, you will find that the current through the 50, 100, and 200 ohm resistors is 4 amps, 2 amps, and 1 amp respectively. So the total current flow in this circuit is 7 amps.

As a check on our previous calculations, the resistance of the entire circuit can be determined by dividing the total current into the applied voltage. This gives 28.6 ohms, which, as you will see, is the same as our previous solution for these three resistors in parallel.

(Continued on Page 42.)

UNIT CONVERSION TABLES

To convert:		
Amperes to milliamperes ..	multiply by	1,000
amperes to microamperes ..	multiply by	1,000,000
megohms to ohms	multiply by	1,000,000
volts to millivolts	multiply by	1,000
volts to microvolts	multiply by	1,000,000
kilowatts to watts	multiply by	1,000
watts to microwatts	multiply by	1,000,000
milliwatts to microwatts .. .	multiply by	1,000
milliamperes to amperes ...	divide by	1,000
microamperes to amperes ..	divide by	1,000,000
millivolts to volts	divide by	1,000
microvolts to volts	divide by	1,000,000
ohms to megohms	divide by	1,000,000
microwatts to watts	divide by	1,000,000
milliwatts to watts	divide by	1,000
microwatts to milliwatts	divide by	1,000
watts to kilowatts	divide by	1,000

RADIO THEORY

(Continued from previous page)

Now we will discuss the combination of these two circuits—the series-parallel arrangement. While no set rules can be formulated for the solution of these complex circuits, it is generally more convenient to reduce the parallel branches to equivalent series circuit and then combine these with the series resistors in the circuit. Thus we have our general formula:

Rt = R1 + (R2 & R3 in parallel) (23)

So in Fig. (4), if the 20, 40, and 60 ohm resistors are connected as shown, what is the resultant resistance? First of all solve for the 40 and 60 ohm resistors in parallel. Using formula (23) this turns out to be 24 ohms, and, since this is in series with the 20 ohm resistor, the total resistance will be 44 ohms.

CURRENT FLOW

Now the calculation of the division of current in such a circuit is slightly more complicated than our previous examples. Assuming the applied E.M.F. is 220 volts, first of all let us determine the total current flow.

Using the formula I equals E / R, we find this is 5 amps. From this we can work out the voltage drops across the series resistor and the parallel network. So we obtain 100 volts and 120 volts respectively.

Now the 5 amps current flow flows through R1, and then subdivides itself between the two parallel resistors in direct proportion to the resistance values. By dividing the applied voltage by the resistances in ohms, the current flow through each resistor can be easily calculated.

In doing this we find the respective currents are 3 and 2 amps respectively. Since the sum of the currents through the individual branches of a parallel circuit must equal the total current flow, we find that 3 + 2 equals 5, which shows our calculations must be correct.

VOLTAGE DIVIDERS

The only remaining point to mention is in regard to voltage dividers. Now that the ordinary type of voltage is very difficult to obtain, these calculations are becoming more important, in view of the fact that a variety of intermediate voltages are required in most receivers.

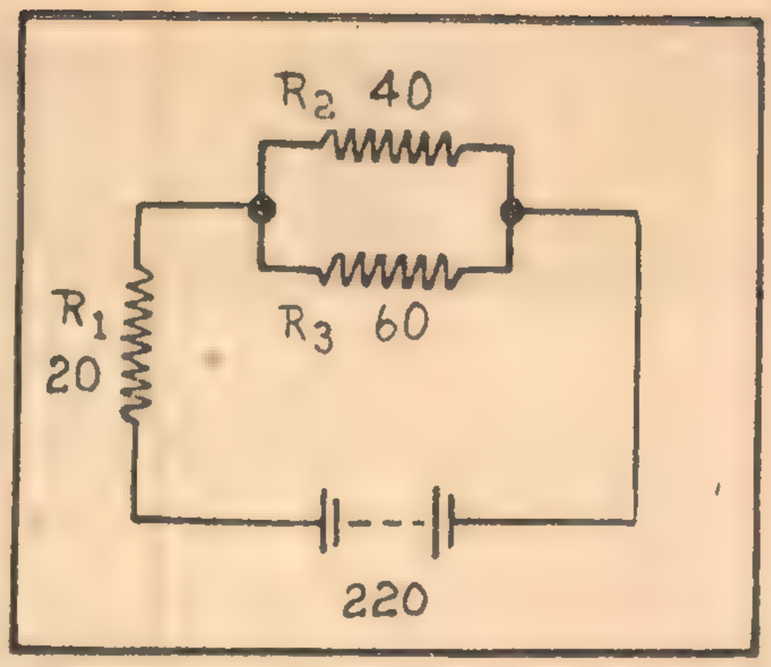


Figure 4. Here is a typical series parallel network of resistors. Usual approach to problems involving such a network is to work out the net value of individual parallel branches, then adding to find the net series resistance.

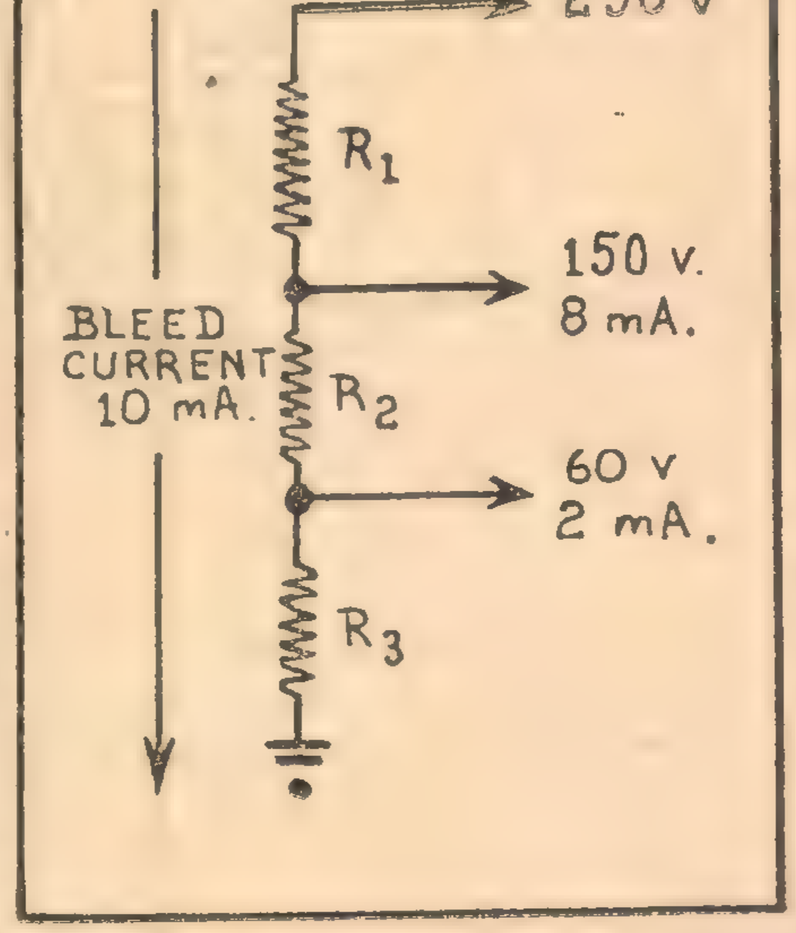


Figure 5. A typical voltage divider network having two intermediate voltage taps. The method of calculating voltage divider networks is outlined in the text.

There are two approaches to voltage divider design. One can assume some definite value of bleeder current and then calculate the individual resistors in the network. Alternatively, one can assume a suitable bleed resistor at the earthed end of the network, then calculate the exact total current flowing to earth from the last tapping, working back to the high potential end in steps.

TYPICAL CALCULATIONS

Using the first approach, let us design a voltage divider to give intermediate output of 150 volts at 8 m.a. and 60 volts at 2 m.a. The applied E.M.F. in this case is 250 volts. Fig. (5) will show you the voltage divider arrangement required, in which it is necessary to determine the values of R1, R2, and R3.

Assume that the bleeder current through the network is to be 10 milliamps. Now, since the supply voltage is 250 volts, and only 150 volts is required at the first tapping, there will be 100 volts drop across R1, and similarly across R2 there will need to be a voltage drop of 90 volts.

On page 31 of our last issue, there was an inadvertant error in the equation involving fractional quantities. The figure 132 should be 22 and the answer X equals 2.

First of all let us determine the current flow through each resistor. From Fig. (5) it will be seen that the bleeder current, plus the current drawn from the two tappings, must flow through R1—that is, 20 milliamps in all. Similarly, through R2 there will be the bleeder current and the current from the second tapping—12 milliamps, while only the 10 milliamp bleeder current will flow through the R3.

So far so good. Now we can determine the respective resistor values by applying the formula R = 1000 × E / I, remembering E is the voltage drop across the particular resistor, while I is the respective current flow in milliamps. So on working these out you will find that the values of R1, R2, and R3 are 5000, 7500, and 6000 ohms.

Naturally, things will not always work out quite as nicely as this, and you will most likely find odd resistor values are obtained. In this case, the nearest standard value can often be used (providing the discrepancy is not too great) without upsetting the circuit arrangement to any great extent.

SECOND APPROACH

The second approach to the design of a divider network is not easy to summarise, and we suggest that you turn back to the last part of the article in the July issue.

Well, now that completes our revision of all the D.C. formulae discussed up to date, and if you understand all these you will have a good background for our later discussions on alternating currents.

In the next issue the use of graphs and methods of reading them will be discussed. So until then I will wish all the readers a Merry Christmas and a victorious New Year.

TRY THESE PROBLEMS FOR PRACTICE

1. How much current will flow through an 80 ohm resistor if the applied E.M.F. is 440 volts?
2. Find the E.M.F. in microvolts required to force a current of 560 ma through a resistance of 0.0250 megohms.
3. If the current flow in a circuit is 150 ma with an E.M.F. of 2.5 volts, find the resistance of that circuit.
4. If an electric iron connected to the 240 volt mains takes 2.5 amps, how much power does it consume?
5. If a milliameter connected in series with a 500 ohm cathode bias resistor reads 12.5 mA. determine (a) wattage dissipated in resistor and (b) the voltage developed across the resistor.
6. Three resistors of 6.87 ohms, 9.13 ohms and 20.5 ohms are connected in series across a supply voltage of 220 volts. Determine the voltage across each resistor.
7. A 110 volt soldering iron rated at 300 watts, is to be used on a 220 volt line. Find (a) the resistance required to be connected in series to limit the current to the rated value and (b) wattage dissipated in the additional resistor.
8. What is the equivalent resistance of 125, 300, 500 and 1000 ohms connected in parallel.

AND THE ANSWERS:—

(1) 5.5 amps
(2) 1.4 times 10 to the tenth uV.
(3) 16.7 ohms
(4) 600 watts
(5) 78.1 milliwatts, 6.25 volts
(6) 41.4 V., 55 V., 123.6 V.
(7) 40.3 ohms, 300 watts.
(8) 69.8 ohms.

COIL DETAILS FOR SMALL RECEIVERS

As has always been the case, hundreds of radio enthusiasts are deriving endless hours of pleasure tinkering with one and two valve receivers, bringing in stations not only on the regular broadcast band, but on the short-waves from all parts of the world. It is not surprising, then, that we are constantly receiving requests for coil data for such receivers. The following data is reprinted from the July, 1942, issue.

CONSIDERING the dozens of different detector valves, the variety of tuning condensers and coil formers and the variety of wire gauges and insulation, we can scarcely be expected to supply exact specifications to meet all possible combinations of components. Nevertheless, we want to be as helpful as we can.

The best we can hope to do is to give approximate coil data to act as a guide, leaving it to individual experimenters to make the final adjustments. After all, half the fun is in getting the completed receiver to behave as we want it to do.

MAKING ADJUSTMENTS

Thus, if a receiver proves in practice to be too unselective, try the effect of reducing the number of turns on the primary winding and/or increasing the spacing between primary and secondary. This improves the selectivity at the expense of the gain. Increasing the number of turns and/or the coupling has the opposite effect.

If a receiver misses out on the high frequency end of the band, reduce the number of turns on the secondary. If it fails to cover the low frequency end of the band, increase the number of turns on the secondary.

With regard to the reaction winding: If the receiver fails to oscillate towards the low frequency end of the band, it may be necessary to increase the number of turns on the reaction winding and/or to move it closer to the secondary. If the reaction cannot be controlled properly, it may be necessary to remove turns and/or move the winding away from the secondary. If the reaction does not work at all, try reversing the connections to the reaction winding.

AERIAL COILS

BAND.	PRIMARY.	SECONDARY	REACTION (if any).
Broadcast Band.	15 t: 32 g. enam. spaced ⅛in. from earthed end of secondary.	110 t. 32 g. enam. close wound.	40-80 t. 40 g. enam. spaced ⅛in. from grid end of secondary
70 to 220 metres. 4.3 to 1.3 mc/s.	11 t. 32 g. enam. spaced ⅛in. from earthed end of secondary.	38 t. 24 g. enam. close wound.	20-40 t. 32 g. enam. spaced ⅛in. from grid end of secondary
30 to 90 metres. 10 to 3.3 mc/s.	7 t. 32 g. enam. spaced 1-16in. from earthed end of secondary.	14 t. 24 g. enam. spaced to occupy ½in.	10-20 t. 32 g. enam. spaced ⅛in. from grid end of secondary
10 to 33 metres. 30 to 9 mc/s.	2 t. 32 g. enam. interwound from earthed end of secondary.	5 t. 24 g. enam. spaced to occupy ½in.	5-8 t. 32 g. enam. spaced ⅛in. from grid end of secondary.

R-F COILS

Specifications for the R-F coils are identical to those for the aerial coils, except for the primary windings. The number of primary turns for the respective bands are as follows: Broadcast band, 25 turns; 70-220 metre band, 15 turns; 30-90 metre band, 10 turns; 10 to 33 metre band, 4 turns. In the case of receivers with an R-F stage, the reaction winding is wound on to the R-F coil instead of the aerial coil.

TUNING CONDENSERS

For reasonable coverage of the broadcast band, a tuning condenser with a maximum capacitance of from 350 to 400 mmfd. (.0004 mfd.) is required. The use of a smaller tuning condenser would necessitate additional sets of coils, or, alternatively, the switching in of a capacitance in parallel with the tuning condenser to cover the low frequency end of each band.

Thus, when using a .00025 mfd. condenser, the high frequency portion of each band may be covered in the normal manner. To cover the low frequency portion, switch a mica condenser of .0001 or .00015 mfd. directly in parallel with the tuning condenser.

The above coil details are on the assumption that the tuning condenser has a maximum capacitance in the vicinity of 400 mmfd. The overlap is sufficient to allow for considerable variation in maximum and minimum capacitance.

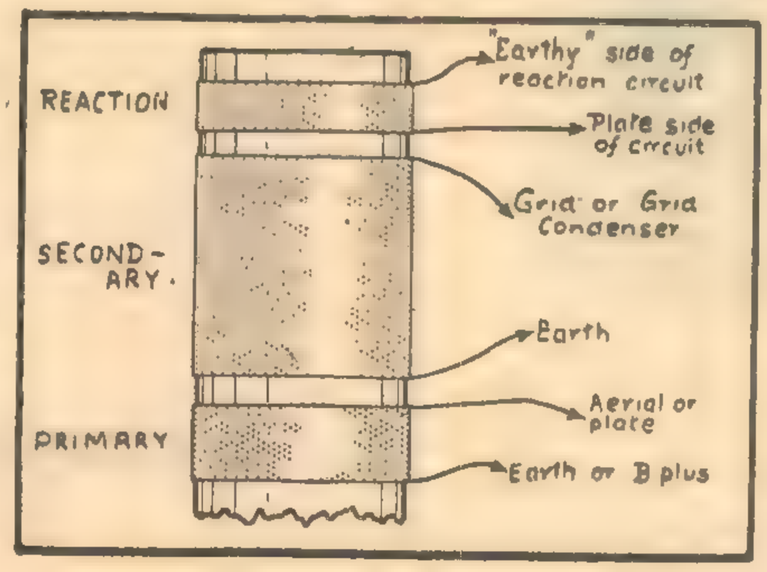
All coils are wound on 1¼in. diameter formers, which is the most usual size for plug-in coils. For the sake of economy, only three popular B and S gauge enamelled wires are specified. Wires of slightly different gauge and/or with different insulation could be used. but due allowance would have to be made for the different space occupied by the coils and the resultant effect upon the inductance.

CONNECTIONS, &c.

Unless otherwise stated, all coils are normally wound in the same direction. The normal connections are as follows: Top of reaction winding to the "earthy" side of the circuit, bottom towards the plate; top of the secondary winding towards the grid, bottom to earth; top of the primary winding to the aerial or to plate, as the case may be, bottom to earth or to B plus.

In the case of receivers without an R-F stage, the coils will be exactly as under the heading "AERIAL COILS," No R-F coil is used.

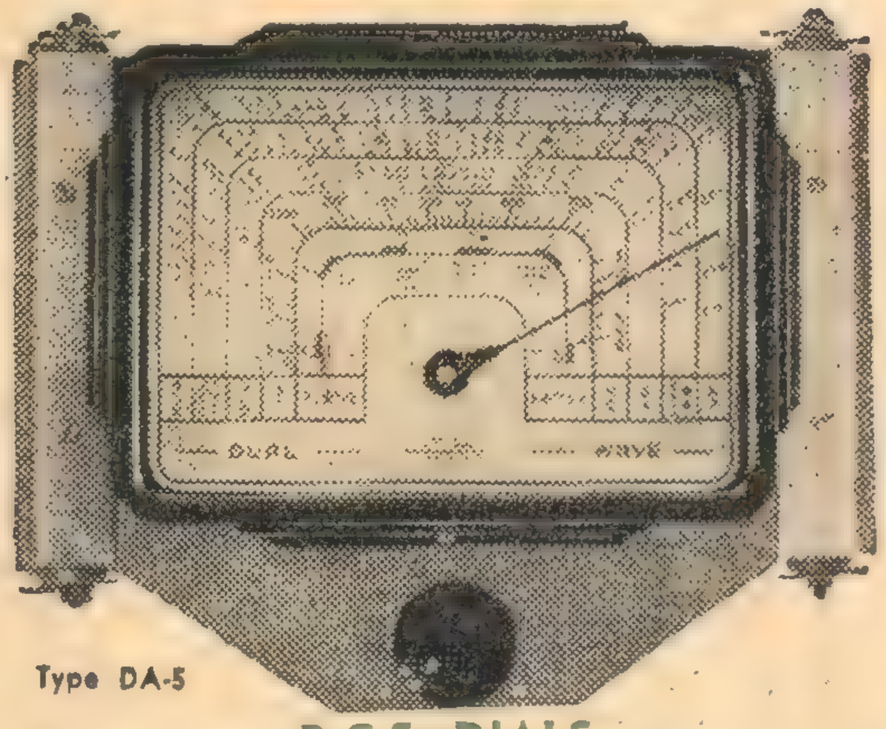
In the case of receivers with an R-F stage, the aerial coil has a primary and secondary winding only. The reaction winding is added, instead, to the R-F coil, so that the R-F coil has a primary winding as specified, a secondary winding, and a reaction winding.



WHATEVER CIRCUIT YOU CHOOSE TO BUILD

● Admittedly genuine R.C.S. Trolitul Coils and Components may be hard to get at the present time, but if they are available make sure of best results by using them for your new circuit. And look after existing equipment carefully—it may be some time before our war activities will permit us to produce supplies for general use.

Make sure of perfect Results by using **R.C.S.** *components whenever possible*



Type DA-5

R.C.S. DIALS

Types DA1 and DA2 are single glass dual-wave, the type DA2 having been designed especially for use with the Five-Band Communications Coil Kit and "H" type condenser. Type DA1 is a standard dual-wave dial for use with R.C.S. coils and "F" type condenser. The DA-5 dial is for use on the 1600 to 550 k.c. and 13.7 to 40 metre bands, with "H" type condenser. All this series is edge-lit and wedge-driven. Aperture for the escutcheon is approximately 7in. x 4⅞in.

DA1—Standard D/W Dial, "F" condenser	22/6
DA2—Communications Dial	22/6
DA-5—13.7 to 40 metres D/W condenser	22/6
DA-6—Mantel Set Dial, D/W "H" gang	18/9
DA-7—Portable Kit Dial D/W "H" gang	9/-
DA-8—Same as DA-7 but ready assembled	13/6

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IF163 3rd	13/9
465 K.C. I.F.'s	
IF166 1st	7/6
IF167 2nd	7/6
Air Cores 175 K.C.	
IE68 1st	7/6
E69 2nd	7/6
IF162	
465 K.C. I.F.'s	
When two I.F.'s are used:	
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IF163 2nd	13/9

E342

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E344 Osc.	6/6
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E346 R.F.	8/6
E347 Osc.	8/6
T.R.F. TYPE-AIR CORE	
T88 Aerial	6/6
T89 R.F.	6/6
T87 R.F. with reaction	6/6
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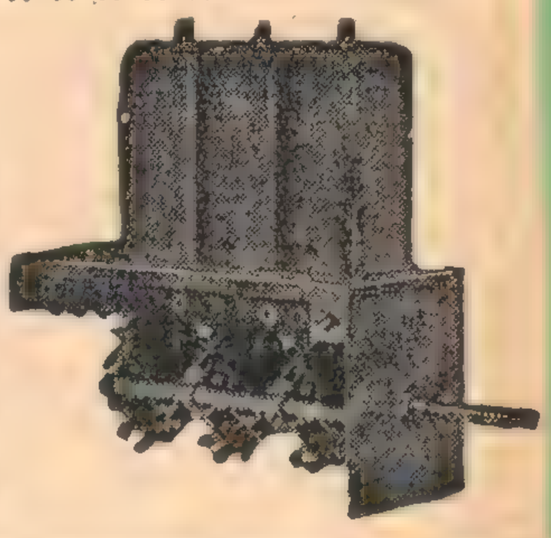

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3LO	770	390	Melbourne, Vic, A
2KA	780	385	Katoomba NSW, B
4TO	780	385	Townsville, Q, B
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2BH	790	380	Broken Hill, B
4QG	800	375	Brisbane, Qld, A
5RM	810	370	Renmark, SA, B
3GI	830	361	Sale, Vic, A
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7HO	860	349	Hobart, Tas, B
4GR	860	349	Toowoomba, Q, B
2GB	870	345	Sydney, NSW, B
6PR	880	341	Perth, WA, B
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3UL	880	341	Warragul, Vic, B
5AN	890	337	Adelaide, SA, A
2LM	900	333	Lismore, NSW, B
7AD	900	333	Devonport, Tas, B
4RK	910	330	Rockhampton Q, A
2XL	920	326	Cooma, NSW, B
4VL	920	326	Charleville, Q, B
3UZ	930	323	Melbourne, Vic, B
4QR	940	319	Brisbane, Qld, B
2UE	950	316	Sydney, NSW, B
5DN	960	313	Adelaide, SA, B
3BO	970	309	Bendigo, Vic, B
4AY	970	309	Ayr, Qld, B
6AM	980	306	Northam, WA, B
2KM	980	306	Kempsey, NSW, B
2GZ	990	303	Orange, NSW, B
4MB	1000	300	Maryborough, Q, B
7EX	1000	300	Launceston, T, B
4CA	1000	300	Cairns, Qld, B
3HA	1010	297	Hamilton, Vic, B
2KY	1020	294	Sydney, NSW, B
3DB	1030	291	Melbourne, Vic, B
5PI	1040	288	Crystal Brk, SA, B
2CA	1050	286	Canberra, ACT, B
4SB	1060	283	Kingaroy, Qld, B
6WB	1070	280	Katanning, WA, B
2RG	1070	280	Griffith, NSW, B
7HT	1080	278	Hobart, Tas, B
2LT	1080	278	Lithgow, NSW, B
4RO	1080	278	Rockhampton Q, B
3LK	1090	275	Lubeck, Vic, B
6MD	1100	273	Merridin, WA, B
7LA	1100	273	Launceston Tas, B
4LG	1100	273	Longreach, Qld, B
2UW	1110	270	Sydney, NSW, B
4BC	1120	268	Brisbane, Qld, B
6ML	1130	265	Perth WA, B
3CS	1130	265	Colac, Vic, B
2AD	1130	265	Armidale, NSW, B
2WG	1150	261	Wagga, NSW, B
7ZR	1160	259	Hobart Tas, B
2NZ	1170	256	Inverell, NSW, B
3KZ	1180	254	Melbourne, Vic, B
2CH	1190	252	Sydney, NSW, B
2GF	1210	248	Grafton, NSW, B
3YB	1210	248	Warrnambool V, B
6KG	1210	248	Kalgoorlie, WA, B
4AK	1220	246	Oakey, Qld, B
2NC	1230	244	Newcastle, NSW, A
6IX	1240	242	Perth WA, B
3TR	1240	242	Sale, Vic, B
3SR	1260	238	Shepparton, Vic, B
2SM	1270	236	Sydney, NSW, B
3AW	1280	234	Melbourne Vic, B
4BK	1290	233	Brisbane, Qld, B
2TM	1300	231	Tamworth NSW, B
5AD	1310	229	Adelaide, SA, B
3BA	1320	227	Ballarat, Vic, B
6PM	1320	227	Fremantle, WA, B
4BU	1330	226	Bundaberg Qld, B
3SH	1330	226	Swan Hill, Vic, B
6TZ	1340	224	Dardanup, WA, B
2LF	1340	224	Young, NSW, B
3GL	1350	222	Geelong, Vic B
4GY	1350	222	Gympie, Qld, B
3MA	1360	221	Mildura, Vic, B
4PM	1360	221	P. Moresby NG, B
2MO	1370	219	Gunnedah NSW, B
5SE	1370	219	Mt Gambier, SA, B
6GE	1370	219	Geraldton, WA, B
4BH	1380	217	Brisbane, Qld, B
2GN	1390	216	Goulburn NSW, B
4MK	1390	216	Mackay, Qld, B
2PK	1400	214	Parkes NSW, B
2KO	1410	213	Newcastle NSW, B
3XY	1420	211	Melbourne, Vic, B
2WL	1430	210	W'longong NSW, B
6KY	1430	210	Perth, WA, B
2QN	1440	208	Deniliquin, NSW, B
4IP	1440	208	Ipswich, Qld, B
7DY	1450	207	Derby, Tas, B
2CK	1460	205	Cessnock, NSW, B
5MU	1460	205	Murray Br, SA, B
2MW	1470	204	M'lumbah, NSW, B
3CV	1470	204	Charlton, Vic, B
2AY	1480	203	Albury, NSW, B
2BE	1490	201	Bega, NSW, B
4ZR	1490	201	Roma, Qld, B
2BS	1500	200	Bathurst, NSW, B
3AK	1500	200	Melbourne, Vic, B

NOTES

(A) indicates that the station is a National or Government owned station, operated by the Australian Broadcasting Commission. (B) indicates that the station is a privately owned commercial station.

Station 2HD Newcastle, 5KA Adelaide, 5AU Port Augusta were ordered off the air for reasons apparently connected with National security.

Station 4AT—a commercial—was ordered off the air at the same time as 2HD, 5KA, 5AU but was later taken over by the Australian Broadcasting Commission and now operates as a regional station.

The following call signs are no longer heard, some having been off the air for several years: 2XN Lismore; 2LV Inverell; 3HS Horsham; 6BY Bunbury; 3MB Burchip changed call and location to 3CV Charlton; 7UV, Ulverston changed call and location to 7AD Devonport; 2MG Mudgee is now off the air.

Station 3AK is now the only Australian on an all-night schedule.

THE MONTH ON SHORT WAVES

by Ted Whiting

A YEAR IN RETROSPECT

At this period of the year we are given to looking back, taking stock of the position, in order to ascertain whether we have been successful in our endeavors over the past year. This pause in our efforts is very interesting, especially in short wave radio, for we can find many things of interest to us all in the happenings of the past year.

AS we write, we receive news of the Allied successes on the several fronts, and it seems that at long last we are about to turn the corner, that in the not-to-distant future, we can look forward to much happier times. We only hope that all those of our reporters whose names have temporarily vanished from our pages will once more be able to resume the peaceful way of living.

A look at our log for the past year shows that there are many stations which have only been with us for a short period; on the other hand there are many others whose signals have been delighting the ears of the enthusiast for a considerable time. The many hours of transmission, which are devoted to the entertainment of our troops, bring home to us the widespread nature of this war, and we feel that it is a grand thing that in this age we have such a blessing for our entertainment.

Stations from all continents have made their initial appearance in our pages from month to month, and we would commend the observance of our reporters who, in many cases, have turned in one new station after another. Our thanks are due to them for their efforts toward the furtherance of our mutual hobby.

The outstanding feature of this year has been the appearance of the many American stations which have been put into service, not forgetting the rearrangement of the BBC schedules and those of our own Australian stations. The authorities were quick to appreciate the value of the spoken word amid the turmoil of the world of today, and we hope that, for many months yet, we will be bringing to your attention more "New Stations for the Month."

NEW STATIONS OF THE MONTH

UNFORTUNATELY there are but few new stations this month, so we hope that during the Christmas period we will be able to hear a few new ones, and in the next issue present them in these columns.

VLG9 MELBOURNE

A further station put into service for the Americas is now to be heard from 2 pm till 2.40 pm daily. This one was brought to our notice by the same Mr. Condon. The frequency is 11895kc, 25.22m, and the signal is said to be a very good one.

VLQ10 AUSTRALIA

A new station has been placed in service in lieu of VLQ5 in the transmission directed to the USA. This station operates on 9590kc from 3.25 pm till 4 pm. The signal at Mr. Churcher's location was perfect, and a definite improvement on its predecessor.

XGAW SHANGHAI

A new one operating on 6090kc, 49.25m, has been heard first in New Zealand and more recently here at fair strength, operating at midnight. This one is also using a frequency of 800kc. The news is read in English at 12.45 am by an American male speaker. We expect that this station will be heard at increased strength in the months to come. Any further reports on this station will be welcomed.

WCR NEW YORK

Another new one is being reported from Mr. Condon as being heard at 9 am, and at fair strength, too. The station operates on 9550kc, 31.41 m, and although we have not had a chance of hearing them, we feel sure that they should be received fairly generally over the States.

DXV BERLIN

The German authorities have placed DXV in service, and it is heard very well at 11 o'clock each night. Mr. Gillett has been hearing them at just before midnight carrying a programme of POW news. The strength was a little weaker than either DJE or DJH, which are operating at terrific strength on this band. DXV, which operates on 17820kc, 16.84m, is also being heard by Mr. McKinnon from opening at 7.30 pm at good strength.

Reports for the February issue should reach Mr. Ted Whiting not later than Saturday, January 9th, 1943. The address:—16 Louden-street, Five Dock, NSW.

The writer would like to take the opportunity of thanking those readers who have sent in reports so consistently throughout the past year and extend to them the greetings of the season.

XMAS BROADCASTS

LISTENERS on the short wave bands hear much which is never heard on the B/c bands. We are able through the medium of radio to hear how other peoples of the world celebrate their Christmas.

This year these celebrations will be somewhat limited, but nevertheless there will be much to hear which is interesting.

The popular choice will, of course, be the BBC services, which are all heard well here, and it will be well worth the trouble of rising early and listening to the Home service at 6 am on Boxing Day.

The Americans will, doubtless, put on some special programmes which will be worth hearing.

In past years the Germans and Italians have also participated in these celebrations, but this year their broadcasts may be rather different.

Other broadcasts which will prove interesting are those of our own Australian stations operating for the benefit of our troops stationed so far from home, and so by listening to them we can feel that for a brief period we are with them and celebrate this Christmas with them.

MYSTERY STATIONS

From time to time we bring to our readers' attention various stations which have defied identification. There are still some outstanding from the last issue, and up to the present we have no line as to their identity.

The Italian heard on 15121kc, 19.84m, is still being heard at about 10.30 pm, and is coming in at good strength, but they seem to us to fail to give their call. This is rather unusual for Italians for, in this respect, they are very attentive.

The South African which has, in certain locations, been heard during the past few months is still a mystery as regards its call and location. This one is definitely a South African and is heard in relay with the others of their network. We hope in the near future to solve this one, although, as the summer passes, we will have a better chance of hearing them in better conditions.

A station has been heard by Mr. Churcher operating on the 16-metre band.

This one is heard at 12.45 pm, and is an American point-to-point station working with a station in this country. The programme heard was the Command Performance heard so often from the Americans on Sunday nights. We have no record of a station on this frequency and hope that in this case that time will tell.

This one is tuned at just above PMC.

SHORT WAVES

WHEN AND WHERE TO LISTEN

Here is a chart for quick reference, giving the call and listening times for the best short-wave stations on the air. Where the station is not receivable at good strength when it comes on the air the time is given at which reception should be satisfactory.

6 AM TILL NOON

GRR, 6080kc, London. Very good at 6am.

HER3, 6165kc, Schwarzenberg. Very good signal at 6.30am.

DXJ, 7240kc, Berlin. Fine signal at 6.30am.

WLWO, 11710kc, Cincinnati. Heard well from 7am.

KWU, 15355kc, San Francisco. Opens at 7.30am.

Bucharesti, 9255kc, Rumania. A good one at 7.50am.

TPZ2, 8960kc, Algiers. This one heard at 8am.

Moscow, 15228kc, Russia. Good signal at 8.15am.

GRH, 9825kc, London. Very fine at 9am.

Best listening period from 7am till 9am.

NOON TILL 6 PM

PMC, 18135kc, Batavia. Heard at good strength at 8pm.

VUD3, 15290kc, Delhi. This one is on the air at 2pm.

GRH, 9825kc, London. Good signals at 3.30pm.

2RO3, 9630kc, Rome. Also on at 3.30pm.

DJW, 9650kc, Berlin. Listen to this one at 4.30pm.

XEWW, 9503kc, Mexico. Heard at 4.30pm.

KWV, 10840kc, San Francisco. Opens at 5pm.

TPZ, 12120kc, Algiers. This outlet heard at 5.45pm.

Best listening period from 4.30pm till 6pm.

6 PM TILL MIDNIGHT

KWID, 9570kc, San Francisco. Very good nightly at 6pm.

GSB, 9510kc, London. Also very fine at 6pm.

FK8AA, 6160kc, Noumea. Very much improved at 6.15pm.

KGEI, 7250kc, San Francisco. Good at 7pm.

JZL, 17780kc, Tokio. Good signal at 7pm in news.

WGEO, 9650kc, New York. Heard at good strength at 8pm.

VUD3, 15290kc, Delhi. Good on opening at 9.30pm.

GSV, 17810kc, London. Very good from 9.45pm.

GSH, 21470kc, London. Heard well now at 9.45pm.

XGOY, 9625kc, Chungking. Very good at 10.35pm.

XGRS, 11680kc, Shanghai. Also very good at 10.45pm.

Best listening period from 9pm till Midnight.

THIS MONTH'S VERIFICATIONS

COSTA RICA.—In a very interesting card from Mr. Cushen, we learn that this ace listener has recently received no fewer than 20 cards. These, he informs us, are mostly for the reception of B/c Americans (this should gladden the heart of Mr. Hallett), but we think that this is a very fine achievement. A card has been received from TIJMT, and from this we read that the address of this one is National Broadcasting Company, Apartado, 849, San Jose, Costa Rica.

CUBA.—From the same listener we hear that COK are still sending their car number-plates out on reception of correct reports. These plates are well worth getting, so see whether you can hear this one-time popular station.

SYRIA.—Radio Levant have sent a veri to Mr. Keenan, of Randwick. This veri was for the reception of that station in June last. This is indeed a very good catch, and we would like to hear from any of our readers who have been as fortunate as Mr. Keenan.

CANADA.—Upon hearing that CBFY were sending out a new type of card, Mr. Perkins, of Malandra, promptly sent in a new report, and this month was rewarded with another veri from this station. This is his second from Montreal, and he writes to say that this is an attractive card, printed in red, white, blue and silver. Nice work.

AMERICA.—We have previously reported that cards are being received from KWID. This month we hear that Messrs. Gillett, Moore and Scott have also received cards from this one. The card we have here is a very attractive one in red, white and blue, and was kindly sent for our perusal by Mr. Scott. We wonder who was the first to receive this one? Mr. Gillett heard them on May 13, while Mr. Scott heard them on July 3.

CHILE.—This country is apt to be almost forgotten as far as veri's are concerned, but from time to time we hear of some lucky people receiving their cards from this country. Dr. Gaden has recently had this experience in the form of a card from CB1180 in respect to a report on their transmission of 24/11/'42. This gentleman also received cards from KWID for 19 and 31 m. transmissions. WCDA-4, WRUL-W-S. A very good lot for one month in any time, let alone these times.

Since writing the main parts of these notes regarding the veris received by our readers, we have heard that there are some more who have received a card from KWID. These readers are Messrs. Boyd (July 10), Condon, Gillett, Morriss. It will be interesting to find out who was the first to receive this one.

HAITI.—We have recently received a letter from Mr. Condon, of Laura, SA, who has had a most successful month as regards verifications. He has received a card from HHBM, which we regard as a very good catch. Other cards received are from FZI, CB1180, Levant, T14NRH, and one on the B/c band.

FLASHES FROM EVERYWHERE

BRAZZAVILLE.—After much talk about the new frequencies that they intend using in the near future, we hear from Mr. Cushen that these frequencies will be put into operation about the end of the year. We are very interested to see what reception will be like under the new conditions, and we hope that the present trend of conditions will tend to accelerate this change.

MEXICO.—Have any of you fellows heard XEYU during the last few months? Mr. Moore has had his report returned to him, so it seems that the station has signed off for the last time. We would welcome reports on this one.

SAIGON.—We have had several reports from our listeners that Saigon has been heard at various times of the day. The latest is that they have been heard closing at 2.29 pm. This report comes from Malanda, but we doubt whether they could be heard here at this time.

GERMANY.—From the latest advice we have received from one of our listeners we find that the German authorities are putting yet more transmitters into service. There is one which is believed to be under the call of DXL6, and operates on 1513kc, and is heard at midnight regularly. Other frequencies on which they are operating new transmitters are 9590kc and 9525kc. We hope to hear them before the notes for the next issue are written, and be able to include them in that issue.

HAITI.—The owner of HHBM has advised that that station is constructing a new transmitter, and that they will soon be in operation on the 16 and 49 metre bands. We will be very interested in them when they open up on the 16 metre band, as we think they will make a good signal. The latest information will be sent as soon as they are ready to make tests.

WITH OUR S. W. REPORTERS

Mr. D. McKINNON, STRATHFIELD, N.S.W.

WE have among our ranks many who are enthusiastic listeners, and we are pleased to number Mr. McKinnon among those to whom we owe so much This ardent follower of our hobby seems to be always on the spot when anything is happening, even though his listening periods are to some extent limited in their length. However, despite limitations, he always sends in a log which is a pleasure to behold.

INVERTED L AERIAL

The aerial used at Mr. McKinnon's location is a low, simple L type, but in the near future it is planned to make use of the 30ft. steel masts which have seen previous service at other locations which this listener has used.

The present location at Strathfield, in suburban Sydney, is rather a poor one, as he is in a hollow. But, as his logs prove, the reception conditions are not so bad as they may seem at first sight.

Since the main problem is a very high noise level, the final aerial arrangement is intended to be an inverted L with a noise-reducing lead-in.

Two very fine receivers are operated at this post. The first one is a regular console model, commercial job, using eight valves. The valve line-up is as follows: 6U7G RF stage, 6A8G mixer, 6U7G intermediate stage operating at 250kc, 6B6G duo-diode detector, and first audio, 6C5G audio stage driving a pair of 6V6G's in a conventional push-pull circuit. The rectifier is a 5Y3G, also operating in a conventional manner.

FINE TONE, RANGE

This receiver has a very fine tonal quality, and its D-X qualities are no less apparent, since no fewer than 43 verifications have been received from stations logged on this set.

The coils are switched, and cover from 11 meters to 30 meters on the first band, 30 meters to 85 meters on the second band, while the final switch position takes care of the B/C band. As a point of interest, several stations were heard on the 11 meter band in "the good old days."

The second receiver is a product of much hard work and experimentation, as it was built by Mr. McKinnon. It is a very imposing job, mounted in a cabinet finished in battleship grey. This one uses seven valves, consisting of a 6U7G in a RF stage, 6K8G mixer, 6U7G intermediate, 6G8G as second intermediate and diode detector, AVC tube, 6C8G, using one-half only as first audio, 6V6G output tube and an 80 rectifier.

The coils are switched, and in three bands cover from 12 meters to above 60 meters. These coils are very efficient, as a result of much care in the making —care which has been amply repaid by the results achieved.

The circuit is more or less a standard one, following Radio and Hobbies procedure. AVC is applied to the two intermediate stages only, and by means of a switch can be cut out of circuit at will. The speaker is an 8in. permag.

HAND CALIBRATED

Mr. McKinnon is at present engaged in calibrating this receiver, and by this means is very much in touch with the many changes which are taking place these days.

On many occasions this listener has put us wise to changes in frequency of stations which we have not been able to hear, and we find his logs a veritable mine of information.

One case in point was XEWW, which was noticed by Mr. McKinnon to be operating some 30kc off frequency for some days. A report was duly despatched to the station, and we hope that it bears fruit.

Most countries have been heard, and verifications have been received from many stations in various parts of the world. Although the collecting of cards has been somewhat suspended for the duration, we feel that many cards will in the future be delivered at the door of Mr. McKinnon, of Strathfield.

REPORTS FROM OUR READERS

WE have received reports and letters from the following readers during the past month. Our thanks go out to these gentlemen and, in addition, to all those who have been so kind as to submit reports over the past year:— R. G. Gillett, Dudley Park, SA; A. T. Johnson, Maylands, WA; A. T. Cushen, Invercargill, NZ; A. H. Duke, Longreach, Q; A. E. Moore, Brisbane, Q; A. Black, Rockdale, NSW; P. W. Brunt, North Sydney, NSW; L. H. Poynter, East Brunswick, Vic.; J. N. Paris, Prospect, SA; B. Scott, Geelong West, Vic.; A. Walker, Applecross, WA; P. J. Grigg, Geelong East, Vic.; R. M. Churches, Devonport, Tas.; E. Larson, Footscray, Vic.; R. J. Nolan, West Perth, WA; J. B. Keenan, Randwick, NSW; H. Perkins, Malanda, Q; W. Harvey, Dubbo, NSW; R. K. Clack, Home Forces; G. D. Gilbert, Burwood, NSW; Dr. K. B. Gaden, Quilpie, Q; N. A. Hanson, Merrylands, NSW; T. Mullens, Yarraville, Vic.; A. Lee, Merewether, NSW; M. Morriss, Merewether, NSW; J. D. Harrington, Cremorne, NSW; Miss D. Sanderson, Malvern, Vic.; A. S. Condon, Laura, SA; AC1 Boyd, Somewhere in Australia.

Fifty Metres And Over

AS we once said we were of the opinion that the stations in the above category would still be heard in the country regions. The time of reception is we realise, a little difficult for you fellows in the country, but we feel sure that in the near future we will receive many reports for reception on these bands. From our own experience we know that there is much of interest on these bands and the unfortunate part of it is that due to our location we are not able to do much listening on the bands in question. We were very pleased to receive a long list of observations taken by Mr. Keenan from a county location, and we therefore publish the list in the hope that it will assist other listeners.

Bombay, 3360kc, 89.3m, All India Service. Heard at midnight.
Bombay, 3300 kc, 91.2m, All India Service. Heard at midnight.
Bombay, 3490kc, 86.2m. All India Radio. Heard at midnight.
Javanese, 3160kc, 95.1m. Heard from 11.30 pm.
Javanese, 3350kc, 89.7m. Heard from 11.30 pm.
Japanese, 3040kc, 98.7m. Heard from 11 30 pm.
Japanese, 3710kc, 81.0. Heard from 11.30 pm.
Russia, 5430kc, 52.1m. Opens at 2 am. In hook up with the folowing stations.
Russia, 5890kc, 50.93m.
Russia, 5950kc, 50.42m.
Russia, 6030kc, 49.74m.
Russia, 5030kc, 59.64m. This one is heard irregularly.

There may be many more stations which can be heard at around these times and a lot will depend upon the location. We will, therefore, be glad to get your reports.

CHURCHILL'S SPEECH

IN an announcement from London on the day preceding the speech by the Prime Minister, we heard that the BBC was bringing a network into play for the duration of the speech. Many of the transmitters were old ones, but we heard of the following of whom we have no knowledge. The first was directed towards Australia and New Zealand and was announced as 42.13m. Another one was announced as being on 41.25 metres. We have heard neither of these and would welcome reports from anyone who was listening in at that period.

RADIO SUISSE

WE are advised that the popular service from Radio Suisse will be heard in future at a period two hours later than it has been heard over the last few months. It will now be heard therefore at from 7.45 pm until 9.15 pm, and we have no doubt that this time will suit many of our readers much better than the old schedule.

OVERSEAS S.W. STATIONS NOW AUDIBLE

The list of stations shown below comprises only those which have actually been heard in this country during the past few weeks, and does not include stations which are on the air but not heard as yet in this country. A large majority should be heard on any sensitive receiver, and when a station is reported for the first time readers' names who report it are shown in brackets. At the end of each group is a list of correspondents who have sent in reports.

ENGLAND

GSA—6050kc. 49.59m. London. A good signal in the Home and European services at 6 am and 5 pm.

GSB—9510kc. 31.55m. This one is to be heard in the Eastern, Pacific, and Latin American services daily.

GSC—9580kc. 31.32m. Very good signal in the N. American service from 9 am till 3.45 pm.

GSD—11,750kc. 25.53m. Heard well whenever on the air. In use in the African, N. American, Pacific and Eastern services.

GSE—11,860kc. 25.29m. This transmitter is only heard at intermittent periods. Has been heard at 6 pm.

GSF—15,140kc. 19.82m. Another regular which is heard well in the African, Pacific, and Eastern services

GSG—17,790kc. 16.86m. A very good one in a transmission in the French language, opening at 9.30 pm. This one is also heard at 7 pm in the Pacific service.

GSH—21,470kc. 13.97m. Is being heard at most locations now on opening at 9.45 pm in the Eastern service. Good signal most nights.

GSI—15,260kc. 19.66m. Heard well in Pacific service at 6 pm daily.

GSJ—21,530kc. 13.93m. This outlet is not to be heard here this year. It may become audible as time goes on.

GSL—6110kc. 49.10m. Yet another outlet of the Pacifis service from 4.45 pm daily.

GSN—11,820kc. 25.38m. This transmitter is used in the foreign language service of the BBC. Heard here in the European service at 7 am and at 12.30 am. Also in foreign service at 11 am. This is being heard at some locations.

GSO—15,180kc. 19.76m. Heard at 11.15 pm in foreign language service. French and Italian have been heard recently.

GSP—15,130kc. 19.60m. A weak signal in the Pacific service.

GST—21,550kc. 13.92m. This is yet another that may be heard as the summer passes. We have not heard them as yet.

GSU—7260kc. 41.32m. Does not appear to be in service these days.

GSV—17,810kc. 16.84m. Good signal in Eastern service from 9.45 to 12 mid.? ? ? ? / ?

GSW—7230kc. 41.49m. This one is heard in the European service at 6 pm. Good signal at times.

GRD—15,450kc. 19.42m. Pacific service at 7 pm and in the African service at from 3 am.

GRE—15,390kc. 19.49m. A very good signal in the Eastern service at opening at 9.45 pm.

GRP—12,095kc. 24.80m. This one is weaker now in its Latin American transmission at from 8.30 am till 11 am.

GRG—11,680kc. 25.68m. This one is used in the African and N. American services at from 6.30 am and 7.45 am.

GRH—9825kc. 30.53m. Another good one in the N. American service at 8.15 am.

GRI—9415kc. 31.86m. Another one which is heard irregularly. Was used in a transmission in French during the North African invasion. Good signal here.

GRJ—7320kc. 40.98m. European service at 7am daily. In a Spanish transmission at from 6 pm till 6.15 pm.

GRK—7185kc. 41.75m. Is used in the Home service only. Can be heard at this location at good strength at 4 am and 7 pm.

GRM—7125kc. 42.11m. A transmitter which is now being heard in a French transmission at midnight.

GRN—6195kc. 48.43m. Heard when the noise will allow at 6 am. Is also used in the N. American service at 1 pm.

GRO—6180kc. 48.54m. A good signal in the African service at 4 am.

GRP—17,890kc. 16.77m. This one has been reported from S. Australia as heard at 11 pm.

GRQ—18,025kc. 16.64m. This one is not being reported this year.

GRR—6080kc. 49.34m. Yet another Home service station which is being heard at 3 am and at 5 pm at fair strength.

GRS—7065kc. 42.46m. This is one of the Pacific service line-up. This last few weeks has been under a cloud of Morse.

GRU—9450kc. 31.75m. Used only in the African service from 2.30 am to 3 am. The signal is invariably a good one.

GRV—12.040kc. 24.92m. This one is heard in the Latin American service in the forenoon. Also heard in the Pacific service at 7.15 pm.

GRW—6140kc. 48.86m. This is the best of the Home service transmitters heard at this location. We hear them at 3 am and 6 pm.

GRX—9690kc. 30.96m. Heard best at 7 pm in the news for Europe. Also on the air at 7 am.

GRY—9600kc. 31.25m. A good one in the African service at 6 am and in the N. American service at 7.45 am till 9.40 am.

GRZ—21.640kc. 13.86m. Is heard here at 10 pm in Eastern service, previously is heard from 9.15 pm in French. Good signal on a good night.

The following readers have reported stations in the above group: Messrs. Poynter, Perkins, Churcher, Keenan, Gaden, Mullens, Lee, Gillett, Johnson, Johnstone, Larsen, Harvey, Nolan, Grigg, Paris, Black, Gilbert, McKinnon.

INDIA AND ASIA

PMC—18,135kc. 16.54m. Batavia. This station is heard at 2 pm and 10 pm at good strength. POW news is heard at these times.

Voice of Batavia—8846kc. 31.92m. This one is reported as being heard in closing at 2 am.

VUD2—7290kc. 41.15m. Delhi. Heard best at 10.30 pm, but is also heard well earlier.

VUD2—6190kc. 47.47m. Same location. This one is on schedule from noon till 2.35 pm. Heard at fair strength in country districts.

VUD2—4690kc. 60.48m. Same location. On schedule from 12.35 am to 3.15 am.

VUD3—15,290kc. 19.62m. Same location. This one is heard at 2.15 pm, 4 pm and 9.30 pm daily. Good signal at most times.

VUD3—11,830kc. 25.36m. Same location. This one is also heard at 11.30 pm daily.

VUD3—6085kc. 49.30m. Same location. Heard between the hours of 2.30 am and 5 am, when the signal reaches quite good level.

VUD4—9590kc. 31.30m. Same location. This one can be heard during the best part of the day. The strength is not so good here at this location.

VUD6—11,790kc. 25.45m. Heard between 6 pm and 7 pm and also 10 pm and 12.20 am.

VUD6—7270kc 41.27m. Same location. Best time to hear this one is between 12.30 am and 5 am.

VUB2—7240kc. 41.44m. Bombay. Good at night in transmission at 11.30 pm.

VUB2—6035kc. 49.30m. Same location. This one is on the air at from noon till 2 pm daily.

VUB2—4880kc. 61.48m. Same location. On schedule from 1 am till 3.15 am.

VUM2—7270kc. 41.27m. Madras. This one is reported at good strength at from 2.30 am till after news is read at 2.50 am.

VUM2—6150kc. 48.78m. Same location. To be heard at from 11.30 am till 1.30 pm.

VUM2—4920kc. 60.98m. Same location. This one is on the air for the same period as the previous transmitter.

VUC2—7210kc. 41.67m. Calcutta. Heard well in news at 11.30 pm.

VUC2—6010kc. 49.92m. Same location. Yet another one which we cannot hear here as they are on the air from noon till 2 pm.

VUC2—4840kc. 61.93m. Same location. This one is also on the air at the same time.

???—9045kc. 33.17m. Kirkee. The service to Syria is still heard at 4.30 am.

Radio Shanghai—11,970kc. 25.06m. This station of the Indian Independence League is heard well from 10.30 pm till 1 am.

WHO'S WHO IN SHORT WAVE BROADCASTING

COBC, Havana, CUBA

Frequency: 9360kc and 9695kc, wavelength 32.05 and 30.94m.

Operating Schedule: 12pm till 4pm.

Standard Time: 16 hours behind EA Summer Time.

Distance from Sydney: 9000 miles.

Postal Address: Apartado 132, Havana, Cuba.

Identification Details: Relays CMBC and gives their sloaan. "El Progresso Cubano."

Verification Details: A large card is sent out.

TIPG, San Jose, COSTA RICA.

Frequency: 9620kc, wave length, 31.19m.

Operating Schedule: 11pm till 1.30am, 4am till 6am, 11am till 3.30pm.

Standard Time: 17 hours behind EA Summer Time.

Distance from Sydney: 7400 miles approx.

Postal Address: Apartado 225, San Jose, Costa Rica.

Identification Details: Gives frequent announcements in English, TIPG in San Jose, Costa Rica, "La Vox de la Victor." Chimes are used.

Verification Details: Verifies with attractive card, call letters in red, and also pictures.

EQB, Teheran, IRAN

Frequency: 6155kc, wave length, 47.74m.

Operating Schedule: 12.45am till 7am.

Standard Time: 7 hours behind EA Summer Time.

Postal Address: Minstere de Postes, Telegraphes et Telephones, Administration de T.SF., Pahlevi, Teheran, Iran.

Distance from Sydney: 6500 miles.

Identification Details: Call letters easily understood. Lady and male announcers still.

Verification Details: This one verifies by letter.

SHORT WAVES

XGOA—9820kc. 30.86m. Chungking. This one is heard at from 10.30 pm till midnight. Good signal.

XGOY—11,900kc. 25.21m. Same location. Heard at good strength during the period from 7.30 pm to midnight.

XGOY—9635kc. 31.13m. Same location. This one is not reported now but was heard testing some months ago.

XGOY—9625kc. 31.17m. Same location. Heard well on the news at midnight.

XGOY—5950kc. 50.42m. Same location. Audible from 11.30 pm till 1.15 am, when news is read.

XGOX—15,200kc. 19.74m. Same location. Heard carrying news in English at 8.30 pm daily.

XGOI—9300kc. 32.26m. Shanghai. This one is not heard these days, but is on the air at 10.30 pm.

XGOI—9665kc. 31.04m. Same location. This station is in parallel with the previous one. News is heard at 11.15 pm.

XGOK—11,650kc. 25.75m. Canton. Heard at from 11 pm. Usually rather weak.

XGAW—6090kc. 49.25m. Shanghai. Heard at 10.45 pm. American announcer.

XGRS—11,675kc. 25.7m. Same location. This German-owned station is still heard at 8 pm. English is spoken.

XPRA—9830kc. 30.51m. Kweiyang. Heard well at 10.30 pm.

XPSA—8465kc. 35.44m. Same location. The only programmes heard from this one are of the native type. Heard at very good strength at 7.30 am and at 10.30 pm.

XGAP—10,270kc. 29.20m. Peking. Heard nightly at opening at midnight.

XGAP—6100kc. 49.18m. Same location. This one comes in at good level from 11.30 pm.

XLMA—9350kc. 32.09m. Shanghai. This one is still poor here. Reported as being heard well at 11.15 pm.

XMHA—11,855kc. 25.30m. Same location. Heard from 9 pm with good signal.

XIRS—11,980kc. 25.02m. Same location. Heard at 11 pm with fair signal. Also reported at some locations from 11 am until closing at 11.15 am.

XGEI—16,092kc. 18.65m. Kuoming. Has not been reported this month.

FFZ—12,060kc. 24.88m. Shanghai. Heard from 9.45 pm at good level. The Morse interference has eased somewhat.

JQHA—9470kc. 31.68m. Hongkong. Heard at most locations at from 11 pm till 2 am.

MTCY—15,230kc. 19.57m. Hsingking. Heard one evening at 7 pm testing with Rome.

MTCY—11,775kc. 25.48m. Same location. Heard at some locations at 9 pm.

MTCY—9545kc. 31.43m. Same location. Very good signal some days from 8 am till 9 am.

MTCY—6125kc. 48.98m. Same location. It seems that this transmitter is not in use.

MTCY—5740kc. 52.28m. Same location. Good signal in English transmission at 1 am till 2 am.

Saigon—11,780kc. 25.47m. This regular is heard at from 9.25 pm. Is also reported as being on the air at 11.45 am till closing at 12.25 pm.

CR8AA—6250kc. 48.00m. Macao, Portuguese China. Heard nightly in some locations.

HSP5—11,715kc. 25.61m. Bangkok, Thailand. Heard at 11 pm. Lady announcer with usual remarks.

Voice of Thailand—7190kc. 41.72m. Same location. Fair signal on closing at 12.45 am.

Thailand Radio—6044kc. 43.63m. Same location. This one is on the air every night at midnight.

EQB—6155kc. 47.74m. Teheran, Iran. English is used from this one at 5.45 am.

E??—8110kc. 36.99m. Same location. Also heard at the same time in English. French is also used until 8 am.

XYZ—6007kc. 49.94m. Rangoon. Heard at weaker level from 11 pm.

ZHJ—6095kc. 49.21m. Penang. This one is also under Jap control. News in English at 11.30 pm. Fair strength.

JZL—17,780kc. 16.87m. Tokio. News is read at from 7 pm till 7.15 pm.

JZJ—11,800kc. 25.42m. Same location. This one opens at 8 pm. Also heard at 9 am.

JIE2—9695kc. 30.95m. Same location. Heard at 10.30 pm and 12.30 am in news in English. Lady announcer.

JVW—7257kc. 41.34m. Same location. This one is good signal at 7 am.

ZNR2—10,285kc. 28.88m. Aden, Arabia. This one opens at 3.15 am. Heard in the west at 4.45 am.

Radio Levant—8030kc. 37.34m. Beirut, Syria. Heard at good level at opening at 3.30 am.

Singapore—12,000kc. 25m. Heard at very good strength at midnight. Closes at 12.30 am with fair signal.

The following readers have reported stations in the above group: Messrs. Poynter, Perkins, Churcher, Keenan, Gaden, Hanson, Mullens, Lee, Gillett, Johnson, Johnstone, Cushen, Larsen, Harvey, Nolan, Paris, Black, Gilbert, McKinnon.

NORTH AMERICA

WGEA—15,330kc. 19.57m. Schnectady. News is read from here at 1.15 am. Heard at quite good strength.

WGEA—9550kc. 31.41m. Same location. This station opens at 9 am when they are heard at good level.

WGEA—6190kc. 48.47m. Same location. Operates at from 9.30 pm. Sometimes heard at about 11 pm.

WGEO—11,847kc. 25.41m. Same location. Is on the air every night from 8.45 pm in service to Europe.

WGEO—9650kc. 31.08m. Same location. Service to troops in the South Pacific from 8 pm till 11 pm.

WGEO—9530kc. 31.48m. Same location. This transmitter is heard from 9 am till 10 am.

WNBI—17,784kc. 16.87m. New York. A fair signal at 10.15 am on a good day.

WNBI—15,150kc. 19.81m. Same location. Heard at 10 am daily. At times it reaches good strength.

WNBI—11,890kc. 25.23m. Same location. This one is heard on Monday at 6 pm.

WRCA—9670kc. 31.02m. Same location. This old frequency is still in use to good effect. Heard at 5 pm at quite good level.

WCBX—15,270kc. 19.64m. Used in the European service in the forenoon.

WCBX—11,830kc. 25.36m. Same location. Transmission in French at 11.30 pm daily. This one has been heard operating earlier.

WCDA—17,830kc. 16.80m. Same location. News in Spanish at 8 am and 10 am. At noon the news in English is heard in some locations.

WCDA—9590kc. 31.28m. Same location. News in English at 9.30 pm.

WLWO—15,250kc. 19.67m. Cincinnati, Ohio. Best signal here at 6 pm and 1 am. In some locations is heard at 10 am.

WLWO—11,710kc. 25.62m. Same location. Yet another one to listen for at 11 am.

WLWO—9590kc. 31.28m. Same location. Heard at the same time as the 25.62m. outlet.

WBOS—15,210kc. 19.72m. Heard in relay at 1 am with WRCA in news cast.

WBOS—11,870kc. 25.27m. Same location. Heard in parallel with WNBI at 9.30 am.

WRUL—11,790kc. 25.45m. Same location. News is read here at 7.30 am and at 9.30 am. Fair signal at both times.

WRUW—15,350kc. 19.54m. Same location. This one opens at 1.15 am. Excellent signal.

WRUW—11,730kc. 25.38m. Same location. A very reliable signal at 10 am.

WRUW—9700kc. 30.93m. Same location. Heard well on opening at 7.50 am.

WCB—15,580kc. 19.30m. New York. Another one heard well in the morning. Operates from 8.15 am till 9 am.

WCW—15,850kc. 18.90m. Same location. Heard at from 8 am till 9 am at good strength. Is also reported at 1 am.

WDJ—7556kc. 39.70m. Same location. This station is heard at times rather well from 6.45 pm till 9 pm.

WGL—9750kc. 30.76m. Same location. Is on the air from 6.45 pm till 9 pm. Transmission is in European languages.

WJQ—10,010kc. 29.97m. Same location. Used to be a winner here, but is not so good these days. Heard from 8 pm till 12.15 am.

WJT—8800kc. 34.09m. Same location. News is read at 10 am.

WOK—10,555kc. 28.42m. Same location. This old telephone outlet is now used in transmission at 10 am.

KGEI—15,330kc. 19.57m. San Francisco. This outlet is on the air from 11 am daily. Heard at fair strength at 2 pm in some areas.

KGEI—11,730kc. 25.58m. Same location. A good signal towards the end of transmission at from 3.15 pm till 6 pm.

KGEI—9550kc. 31.41m. Same location. This one is heard at from 7 pm till 3 am.

KGEI—7250kc. 41.38m. Same location. A good signal, which is heard from 7 pm till 3 am.

KRCA—9991kc. 31.60m. Same location. This station is not reported this month.

KWID—15,290kc. 19.62m. Same location. Is scheduled for operation from noon to 6 pm. Not so good here.

KWID—9570kc. 31.35m. Same location. A very fine signal in the transmission heard from 6 pm till 9 pm.

KWID—7230kc. 41.49m. Same location. Carries on the transmission from 9.15 pm till closing at 12.30 am.

KWU—15,355kc. 19.53m. Same location. Scheduled from 7.30 am till 9 am. Best at 8 am.

KWD—10,840kc. 27.68m. Dickson. Can be heard opening at 6.30 pm. Closes at 10.30 pm.

KES2—8930kc. 33.59m Same location. Relays KWID at good strength from 9 pm.

KES3—10,620kc. 28.25m. Same location. Also relays KWID from 6 pm till 10 pm.

KEQ—7370kc. 40.70m. Kahuku, Hawaii. This one is not reported this month, but was heard some months ago at 11 pm at good strength.

KID—6420kc. 31.06m. Hawaii. Has been heard from time to time in point to point broadcasts.

KGMB—17,960kc. (approx.). Honolulu, Hawaii. This station has been heard testing at from 10.30 am to 11 am on Friday.

CBFY—11,705kc. 25.63m. Montreal, Canada. Heard at very fine strength at from 10.30 pm till 12.30 am.

CFRX—6070kc. 49.42m. Toronto. This one is reported as heard at midnight. Rather weak.

CJCX—6030kc. 49.83m. Sydney, NS. Has not been heard here, but should come in at 11.30 pm.

XEXA—6170kc. 48.62m. Mexico City, Mexico. Heard at midnight daily.

XEWW—9503kc. 31.557m. Same location. This one is heard from 4 pm till closing at 5 pm.

XEQQ—9680kc. 30.99m. Same location. Also heard from 4 pm till 5 pm.

The following readers have reported stations in the above group: Messrs. Poynter, Perkins, Churcher, Gaden, Mullens, Lee, Gillett, Johnson, Johnstone, Larsen, Harvey, Nolan, Grigg, Walker, Stott, Paris, Black, Gilbert, McKinnon.

CENTRAL AMERICA AND WEST INDIES

HP5A—11,700kc. 25.64m. Panama City. Still heard at midnight, but is also on the air at 9 am.

HP5G—11,780kc. 25.47m. Same location. This one is reported from the parts of the country where Saigon is not heard.

HP5J—9607kc. 31.23m. Same location. Another one for 11 pm.

HH3W—10,130kc. 29.62m. Port au Prince, Haiti. French and Spanish from here at 7 am. Sometimes heard at fair strength.

HI2G—9295kc. 32.28m. Cuidad Trujillo, Dominican Republic. Has not been reported this month. Listen for them at 8.15 am.

TIEP—6609kc. 44.81m. San Jose, Costa Rica. A good one some nights at 10.45 pm.

TIEMC—11,900kc. 25.21m. Same location. Operates from 11 pm till midnight.

TIPG—9620kc. 31.19m. Same location. A fine signal at 11 pm nightly.

TILS—6165kc. 48.66m. Same location. Heard at 4 pm on Sunday afternoon.

TI4NRH—9740kc. 30.80m. Heredia, Costa Rica. Strangely, this one is not reported, but has been heard here at 3 pm till 4 pm on some Sundays.

TGWA—9685kc. 30.98m. Guatemala City. Look for them on Sunday at from 3 pm till 5 pm.

TGWA—15,170kc. 19.78m. Same location. Heard only on Monday at 8.30 am.

YNRS—8585kc. 34.95m. Managua, Nicaragua. Fair at 11 pm.

COBC—9695kc. 30.94m. Havana, Cuba. On the air at 9 am and 4 pm. The latter time offers the best signal.

COBC—9365kc. 32.05m. Same location. Good signal at some locations at 9 am.

COCH—9435kc. 31.80m. Same location. Heard well at 10.45 pm nightly.

COCM—9830kc. 30.51m. Same location. Good at 11 pm.

COCO—8700kc. 34.48m. Same location. Uses English at 11 pm. Fair signal.

COCQ—6375kc. 47.06m. Same location. This one varies, but before long will be good signal at 10.40 pm.

COCQ—8850kc. 33.90m. Same location. Best time of transmission is from 9.40 pm till 12.30 am. Also heard in afternoon at 5 pm and at 8 am.

COCX—9270kc. 32.36m. Same location. "El Lava Casin." Heard at 9 am and midnight at good strength.

COCY—11,745kc. 25.55m. Heard among the noise at 10.15 pm.

COK—11,620kc. 25.88m. Same location. Is on the air at 9 am and 4 pm.

COHI—6455kc. 46.48m. Santa Clara. Fair signal at 11 pm, which has faded out by midnight.

The following readers have reported stations in the above group: Messrs. Gaden, Perkins, McKinnon.

SOUTH AMERICA

HCQRX—5972kc. 50.23m. Quito, Ecuador. Heard opening at 10.45 pm and on Monday at 9 am.

HCJB—12,460kc. 24.08m. Same location. This is another Monday morning station heard at 9.30 am. Also on the air at 11 pm daily.

HCJB—10,000kc. 30.0m. Same location. This one may not be heard here but operates from 1 pm till 2 pm.

HCJB—4170kc. 71.94m. Same location. This one may be heard in New Zealand in parallel with the transmitter on 10,000kc.

HJCD—6160kc. 40.70m. Bogota, Colombia. Heard in NZ at 1.30 pm.

HJCF—6240kc. 48.07m. Same location. Also heard in NZ at 12.20 pm.

HJCX—6018kc. 49.85m. Same location. This one opens with good signals at 11 pm.

CB960—9600kc. 31.25m. Santiago, Chile. Look for this one at 4.15 pm on Sunday.

CB970—9735kc. 30.28m. Valparaiso. Heard at 10.30 pm daily.

CB1170—11,700kc. 25.64m. Same location. Should be heard at 3 pm with fair signal later in the season.

CB1180—11,975km. 25.05m. Same location. This is now being heard at 10.30 pm.

NEW STATION LOGGINGS

THE following new stations have all been definitely heard and identified at our location since our last issue. Where call letters are not as yet known, station is listed under its location.

Call	Kc	W/L	Location.
VLQ10	9590	31.28	Sydney
DXV	17820	16.83	Berlin
XGAW	6090	49.25	Shanghai
WCR	9550	31.41	New York
VLG9	11895	15.22	Melbourne

OAX1A—6290kc. 47.69m. Chicaylo, Peru. Heard at 2 pm with fine signal.
OAX4J—9340kc. 32.12m. Lima, Peru. Best time to hear them is at midnight daily.
OAX4G—6190kc. 48.48m. Same location. Operates at 3.30 pm on Sunday.
OAX5C—9540kc. 31.45m. Same location. Sunday at 4 pm is the time.
CXA8—9640kc. 31.12m. Colonia, Uruguay. At 7 am daily and on Sunday at 5 pm.
PSH—10,220kc. 29.35m. Rio de Janeiro. Weak signal on Saturday at 10 am.
PSF—14,690kc. 20.42m. Same location. Same service from this one.
PRE9—6105kc. 49.14m. Fortazela, Brazil. This one opens at 8 am.
LSX—10,357kc. 28.98m. Buenos Aires, Argentina. Saturday morning at 10 am.
LRX—9662kc. 31.06m. Same location. Same time and service from here.

The following readers have reported stations in the above group: Messrs. Gaden, Perkins, McKinnon.

AFRICA

ZOY—6002kc. 49.98m. Accra, Gold Coast. This one should prove of interest soon. Schedule 4 am till 9 am. Best time, 6 am.
ZRK—6097kc. 49.20m. Capetown, South Africa. Heard closing at 7.45 am.
ZRH—6007kc. 49.95m. Johannesburg. Also closes at the same time.
ZNB—5900kc. 50.85m. Mafeking. Heard in the same relay closing at the same time.
ZRO—9755kc. 39.75m. Durban. This one has not been reported, but is likely to be heard in the west.
? 5962kc. 50.32m. This mystery is again heard closing at 7.45 am. Who's going to be the first to identify this one?
SUX—7865kc. 18.15m. Cairo, Egypt. Transmission at 7 am in Arabic.
SUP2—6320kc. 47.47m. Same location. A very good one at from 3.30 am till 4.30 am
Radio Cairo—5980kc. 50.17m. Same location. Fair signal at 7 am
Radio Addis Ababa—9620kc. 31.18m. Abyssinia. Heard at 2 am till 4 am. Closes with English announcement.
Radio Tananarive—6162kc. 48.68m. Madagascar. has been heard from 1.30 am till 3 am. Announcements in French.
CR7AA—6300kc. 49.71m. Luanda Angola. Port. West Africa. 8 am and 8 pm till midnight.
CR7AB—3490kc. 35.92m. Same location. Heard at the same times. Here is one for the New Zealanders.
CR7BD—15,250kc. 19.66m. Same location. Same times of transmission.
CR7BE—9840kc. 30.49m. Same location. Heard at 6.30 am till 7.30 am.
CR6RA—9470kc. 31.68m. Same location. Heard on the same schedule.
?ZI—11,970kc. 25.06m. Brazzaville, French Equatorial Africa. A good signal at 6 am and 4.30 pm. News in English at both times.
Radio Cameroun—8000kc. 37.50m. Doula. News in French is heard at from 3.15 am till 3.30 am.
OPM—10,140kc. 29.59m. Leojoldville, Belgian Congo. Another for the early morning. Heard at 5 am.
VQ7LO—6060kc. 49.50m. Nairobi, Kenya. This one is heard from 3.30 am till 5.45 am at fair strength.
Nairobi—10,345kc. 29.0m. Same location. This is said to be transmitting the same programme as VQ7LO, but we are still waiting to receive reports.
TPZ—12,120kc. 24.75m. Algiers, Algeria. Heard at very good strength at 6.45 pm. Is also on the air at 9 am. English is being used occasionally from here.
TPZ2—8960kc. 33.48m. Same location. Heard on the same schedule as their sister station, but is not as strong.
ONR—8035kc. 37.34m. Rabat, Morocco. Another one which may prove interesting soon. Heard at 7 am.
FGA—9410kc. 31.88m. Dakar, Senegal. According to the recent news, should be worth hearing. Is on the air at 6.15 am.

The following readers have reported stations in the above group: Messrs. Gaden, Perkins.

AUSTRALIA AND OCEANIA

VLR—9580kc. 31.32m. Melbourne. National programme. 6.45 pm to 11.30 pm. Closes at 11 pm on Sunday.
VLR3—11,880kc. 25.25m. National programme. Noon to 6.15 pm daily, 12.50 pm to 6.15 pm Sunday.
VLR8—11,700kc. 25.51m. National programme. 6.30 am to 10.15 am daily; 6.45 am to 12.45 pm Sunday.
VLG2—9540kc. 31.45m. To Eastern USA, 10.25 pm to 11.30 pm, 2 am to 2.45 am to Western USA, and 12.15 am to 1.55 am to SE Asia.
VLG3—11,710kc. 25.62m. Transmission to Tahiti in French at 4.55 pm till 5.40 pm. At 1.25 pm to 2.10 pm, and 3.25 pm till 4.10 pm to Western USA; 5.55 pm to 6.25 pm to Britain; and at 6.30 pm to 6.45 pm to New Guinea in the Japanese language.
VLG6—15,230kc. 19.69m. At 8.30 pm to 9 pm to SW Pacific.
VLG7—15,160kc. 19.78m. National porgramme. 6.30 am to 8.10 am; noon to 2 pm; 7 pm to 7.18 pm daily; Sunday, 5.45 am to 8 am; noon to 2 pm and 7 pm to 7.18 pm.
VLQ2—11,870kc. 25.27m. Sydney. To NE Asia at from 9.40 pm to 10.25 pm.
VLQ4—7220kc. 25.28m. In French at 7.25 pm to 8.25 pm to New Caledonia.
VLQ5—9680kc. 30.99m. Service to England from 5.55 pm to 6.25 pm. To West USA at 1.25 pm to 2.10 pm and at 3.25 pm to 4.10 pm.
VLQ8—17,800kc. 16.85m. In service again to West. USA at from 2 pm to 2.45 pm.
VLW—9680kc. 30.99m. Perth. Carries the National programme from 9 pm to 11.15 pm.
VLW3—11,830kc. 25.36m. Good signal from 8 am till 11.45 am.
VLW6—9680kc. 30.99m. To SE Asia at 12.15 am till 1.55 pm.
FK8AA—6130kc. 48.94m. Noumea, New Caledonia. Heard quite well at from 5.30 pm till 6.25 pm.

The following readers have reported stations in the above group: Messrs. Poynter, Perkins, Church, Gaden, Mullens, Lee, Johnson, Cushen, Larsen, Nolan, Grigg, Paris, McKinnon.

MISCELLANEOUS

OIX1—6120kc. 49.02m. Lahti, Finland. Has not been reported this month. Used to be on at 8 am.
OIX2—9500kc. 31.58m. Same location. Scheduled from 2 am till 10 am. News is heard at good strength at 3.45 am.
OIX3—11,870kc. 25.47m. Same location. Same hours as OIX2, and also at from 11.20 am till 5.45 pm. Listen to news at 2.10 pm.
HAT4—9119kc. 32.90m. Budapest, Hungary. Reported as heard at 10.10 am.
HER3—6165kc. 48.66m. Schwarzenberg, Switzerland. Heard using French and German from 4 am till 8.5 am. Good signal.
HER2—11,865kc. 25.28m. Berne, Radio Suisse. Still on the same schedule. Also heard in French and German at from 11 pm till 11.30 pm.
HVJ—5969kc. 50.26m. Vatican City. Service to Britain at from 5 am till 6.30 am.
HVJ—6005kc. 49.96m. Same location. Also heard at 6 am.
HVJ—11,740kc. 25.55m. Same location. A very good signal at 6 pm in POW service.
HVJ—15,120kc. 19.84m. Same location. Heard once a week at from 2 am till 2.30 am on Wednesday only.
CSW6—11,040kc. 27.17m. Lisbon, Portugal. Quite good in transmission from 4 am till 9 am.
CSW7—9740kc. 30.80m. Same location. Is on the air from 9.15 am till 10 am.
Emissora Nacional—7305kc. 41.07m. Ponta Delaga, Azores. A station which is often heard well from 7 am till 8 am.
Radio Caledonia—7010kc. 42.81m. This one is heard in English at 7.45 am.
Radio Metropole—9475kc. 31.66m. Heard at very fine strength at 7.10 am. Female announcer from this one.
Radio Metropole—11,740kc. 25.26m. This one uses an assortment of foreign languages in transmission at 2.15 am.
Radio Metropole—15,245kc. 19.69m. Heard at colossal strength at 7 am.
Europe Revolutionary—9640kc. 31.12m. Anti-Nazi talk in German at 5 am and at 7.30 am.
Radio Debunk—10,340kc. 29.01m. Has been reported from New Zealand as heard at 11.30 am till 12.30 pm.
TAP—9465kc. 31.70m. Ankara, Turkey. Transmits from 1.15 am till 7 am. Good when news is read at 5.15 am.
TAQ—15,195kc. 19.74m. Same location. A fair signal here at 11.30 pm.
Radio Bucharesti—9255kc. 32.41m. Roumania. Some fine orchestral music may be heard from this one at from 3 am till 9 am. News at 7.50 am.
YUB—6100kc. 49.18m. Belgrade, Yugoslavia. On the air from 5 am till 9 am.
SBU—9530kc. 31.46m. Motala, Sweden. Good signal from 8.15 am till 9 am.
SBP—11,705kc. 25.63m. Same location. Scheduled at 4.56 am till 5.15 am, 6.56 am till 8.30 am, and 5.40 pm till 6.30 pm. The latter transmission is heard best now.
SBT—15,155kc. 19.80m. Same location. Easily found at 2 am till 3 am.
LKQ—11,735kc. 25.57m. Oslo, Norway. This one was heard some weeks ago at 4 pm.
PCJ—9590kc. 31.28m. Huizen, Holland. Has not been heard this month.
Paris—6200kc. 48.39m. France. Now being heard at very fine strength at 6 am.
Vichy—9510kc. 31.55m. France. Heard very well at 6 pm daily.
Vichy—9520kc. 31.50m. Same location. Heard at some locations at 2.15 pm.
Vichy—11,845kc. 25.53m. Same location. Is on the air from 4 am till 9.50 am.
Vichy—15,245kc. 19.69m. Same location. From 12.30 am till 3.45 am. Good signal at most times.
Kuibeshev—6115kc. 49.08m. Has been heard in contact with NBC and CBS at 11 pm.
Moscow—7625kc. 39.21m. Can be heard at 7 am and at 10 pm.
Kuibeshev—8047kc. 37.28m. News in English by lady announcer at 6.30 am. Also heard at 9.30 pm.
Kuibeshev—9520kc. 31.51m. Also heard calling NBC and CBS at 11 pm.
Khabarovsk—9566kc. 31.36m. Heard from 8.45 pm onwards on good nights.
Moscow—10,040kc. 29.88m. News and talks in English at 12.30 am.
Moscow—11,860kc. 26.41m. News at 3 pm in Spanish after opening at 2.30 in French.
Moscow—11,950kc. 25.10m. Very good signal at 5 pm.
Moscow—12,060kc. 24.88m. English used here at 11.45 pm.
Moscow—15,230kc. 19.70m. Is to be heard in certain locations at from 10 am till 11 am.
2RO3—9630kc. 31.15m. Rome, Italy. Heard afternoon, evening, and night.
2RO4—11,810kc. 25.40m. Same location. Good signal at 1.30 am, 6 pm, and 7.15 pm. English at all times.
2RO6—15,300kc. 19.61m. Also heard at the same times.
2RO8—17,820kc. 16.84m. Same location. This outlet is heard at 9 pm.
2RO9—9670kc. 31.02m. Same location. Has not been heard over the last few weeks.
2RO11—7220kc. 41.55m. Same location. Is on the air from 3.30 am till 9.15 am. Best signal at 7.30 am.
2RO17—19,590kc. 15.31m. Same location. This one is now heard under Morse at 10 pm.
2RO18—9700kc. 30.74m. Same location. A fair one at 10 am.
2RO20—17,820kc. 16.87m. Same location. Should be heard in good locations if still in service. About 9 pm, possibly.
2RO?—6300kc. 47.60m. Same location. Heard from 3.30 am till 9.15 am. The volume from this one is excellent.
2RO?—10,330kc. 29.04m. Same location. A very good one at 8 am.
2RO?—9695kc. 30.63m. Same location. Carries a service to Latin America commencing at 9.30 am.
2RO?—11,740kc. 25.55m. Same location. Also on the air from 3.30 am till 7 am.
2RO?—11,950kc. 25.10m. Same location. Heard well in the early morning.
2RO?—15,060kc. 19.92m. Same location. Heard very well at 11 pm.
DJA—9560kc. 31.38m. Berlin, Germany. Is on schedule at from 8.50 am till 3.15 pm.
DJB—15,200kc. 19.74m. Same location. Also in the same relay. Good signal.
DJC—6020kc. 49.83m. Same location. Quite good at intervals between 4.30 am and 8.25 am. Good in POW at 6.20 am.
DJD—11,770kc. 25.49m. Same location. In same relay as DJA.
DJE—17.760kc. 16.89m. Same location. An excellent signal from 9 pm till 3 am. Also heard at 6 pm.

The following readers have reported stations in the above group:——Messrs. Poynter, Perkins, Churcher, Keenan, Gaden, Hanson, Mullens, Lee, Gillett, Larsen, Harvey, Nolan, Grigg, Walker, Paaris, Black, Gilbert, McKinnon.

DISTORTION IN DIODE DETECTORS

Diode detectors have come to be used almost universally in modern radio receivers. Fidelity is excellent, provided that the external associated circuit is properly arranged. In this article Mr. Graham outlines factors which have to be taken into consideration in the design of a diode detector circuit.

Mr. L. B. GRAHAM,
Principal of the A.R. COLLEGE

COMPARED to anode bend and grid leak detectors, diodes have the disadvantage on the one hand that they load the tuned circuit and on the other the fact that, in themselves, they contribute nothing to the overall gain of the receiver. The latter objection is overcome by the use of the popular diode-amplifier valves.

Against these known disadvantages must be set its ability to handle an almost unlimited amount of signal. Bias and grid leak detectors overload fairly easily with signals which can be obtained from R-F or I-F amplifiers of an ordinary receiver, and consequently distortion is quite frequently met with.

Diode detectors, however, are not overloaded with even the maximum voltage output from an ordinary R-F or intermediate amplifier, and consequently straight-out overload distortion is eliminated.

Second advantage is that diodes give practically linear detection over a considerable range of signal strength inputs. Because of its characteristics, it is much easier to provide linear detection with the diode detector than it is with the bias or grid leak detector.

Despite this, diode detectors can and often do introduce a considerable amount of distortion in receivers. The distortion which does occur, however, is mainly due to the circuits surrounding the diode detector and it is consequently possible, by suitable arrangement of the circuit, to eliminate practically all the distortion which may occur when this type of detector is used.

SIMPLE CONSTRUCTION

Physically, the diode detector (or rectifier) is about the simplest type which could be imagined.

It consists of an anode and cathode; electrons are emitted when the cathode is heated and are drawn across to the anode when that element is made positive with respect to the cathode. When the anode or plate is negative with respect to the cathode, no current flows, so that the valve has a rectifying action.

The operation is readily appreciated if one examines the characteristic curve of a diode—that is, a plot of plate current against plate voltage.

It is seen that, under conditions where the plate is negative with respect to the cathode, there is no appreciable flow of current. As the potential of the plate becomes approximately equal to that of the cathode, a small flow of current becomes apparent.

NATURE OF CURVE

Small increases in the positive potential of the plate cause increases in the plate current, the plot following an upward curve. Rapidly, however, the curve straightens out and for plate voltages in excess of a certain small figure, the relationship is practically linear, increases of plate voltage causing proportional increases in plate current.

Thus the voltage/current plot of a diode is practically a straight line for the most part, with a small curved portion at the bottom. This curvature, evident with small plate voltages, is responsible for the first form of distortion with which we are going to deal.

FOR LINEARITY

In order to obtain distortion-free output from a diode detector, or, for that matter, from any detector, regardless of type, the applied signal voltage must be such as to carry the modulation away from the bent portion of the characteristic curve. Although the detector's principle is to eliminate half of the radio frequency carrier wave, it must not affect the modulation which is carried by the other half of this wave.

This means that the variations of amplitude which represent the original audio signal applied to the radio frequency carrier wave must work entirely on the straight part of the detector characteristic curve.

A little thought will show that, in addition to the strength of signal applied to the detector tube, the amount of modulation of the radio frequency carrier will affect the amount of distortion introduced by the detector.

If the curve of the detector has only a very small bent portion, it may handle large percentages of modulation without producing any considerable amount of distortion. If, however, the amount of curvature is great, only a small percentage of modulation can be handled before distortion occurs.

DETECTOR DISTORTION

In the grid leak and bias detector types, the curved section, being comparatively large, introduces some distortion even on small amounts of modulation. This type of distortion can be eliminated to a large extent by taking advantage of the diode detector, which has a characteristic more nearly approaching a straight line.

However, a diode can give a large percentage of distortion if a weak signal is applied to it and if that signal carries a high percentage modulation. As an example, if a signal which is modulated 80 per cent. is applied to the plate of the diode detector at a strength of .03 volts, second harmonic distortion will amount to approximately 20 per cent.

As the ear notices distortion of about

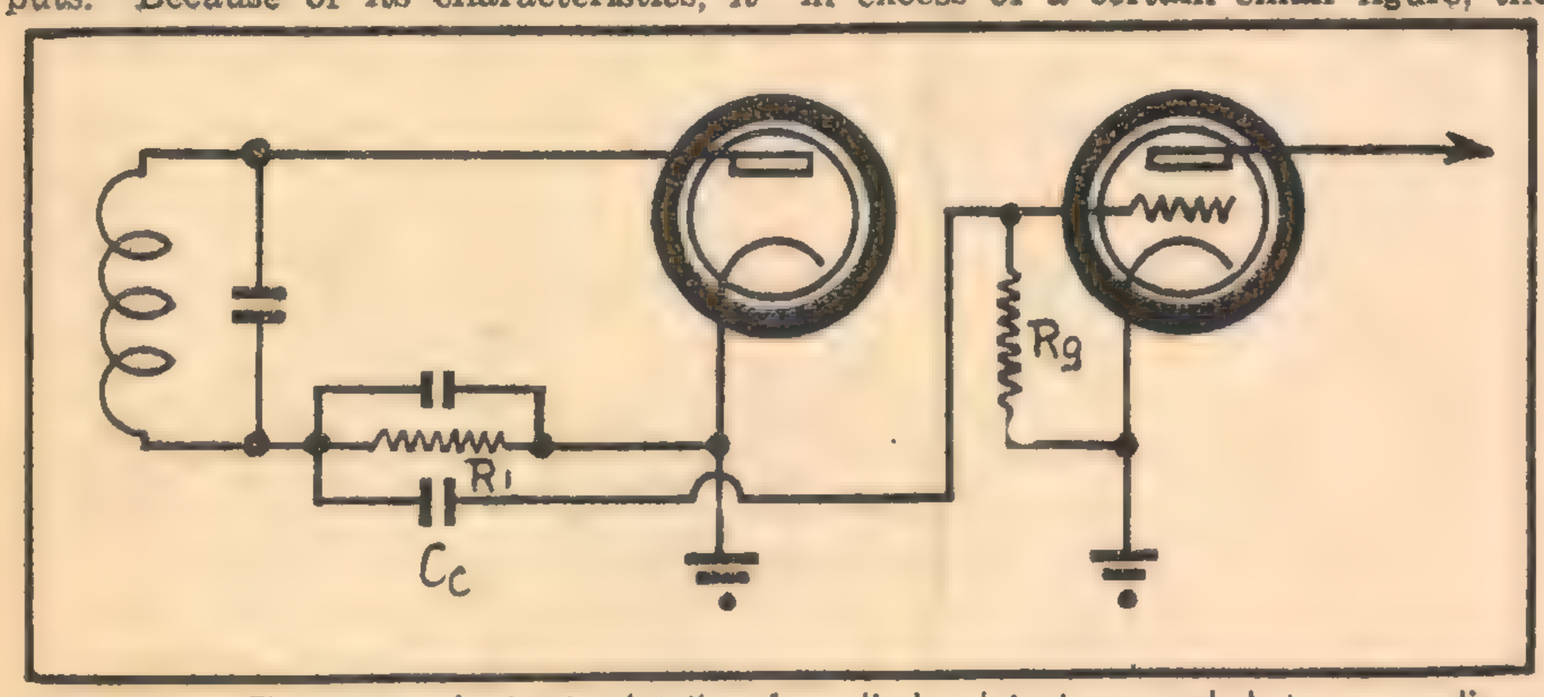

Figure 1. The essential circuit details of a diode detector coupled to an audio amplifier. Resistor Rg may be a volume control, in which case the grid returns to the moving arm. For audio frequencies resistor Rg is really in parallel with the diode load R1 and its value has a definite effect upon the operation of the circuit.

2½ per cent., a distortion figure of 20 per cent. would be very obvious in the output of a receiver. It would be quite useless having a high fidelity audio amplifier and distorting the signals to the extent of 20 per cent. before reaching the amplifier.

SIGNAL LEVEL

Fortunately, it is a comparatively simple matter to eliminate distortion of this nature by making sure that the signal which reaches the diode detector is of sufficient strength to carry the modulation up off the bend of the characteristic curve.

Provided the signal which is applied to the anode of the diode detector is greater than an average of one volt, substantially linear detection will be obtained.

This means, of course, that the receiver must have quite a lot of gain ahead of the detector, even for comparatively local stations. For distant stations, the requirements in this direction are still higher, although one is not so concerned with obtaining absolute fidelity on weak signals. In any case, reception is marred by noise both external to the receiver and internal as well.

In practice, freedom from this distortion may be obtained by a judicious balance between the gain in the pre-detector and audio stages of a receiver.

OLD-STYLE RECEIVERS

In the case of a receiver having a manual gain control in the tuning end, the amplifier should be rendered comparatively insensitive either by reason of its design or by the inclusion of some network introducing a degree of loss. The amplifier should require an input from the detector of at least one volt for full output.

This ensures that the receiver has to be operated at all times with a fairly high input to the diode detector, although for normal room volume, the input may still be rather on the low side.

Some early superhets with manual gain controls in the tuner portion are very poor in this respect, having high gain amplifier and no provision whatever for limiting the gain after the detector. In consequence, the detector necessarily operates on the curved portion of the characteristic.

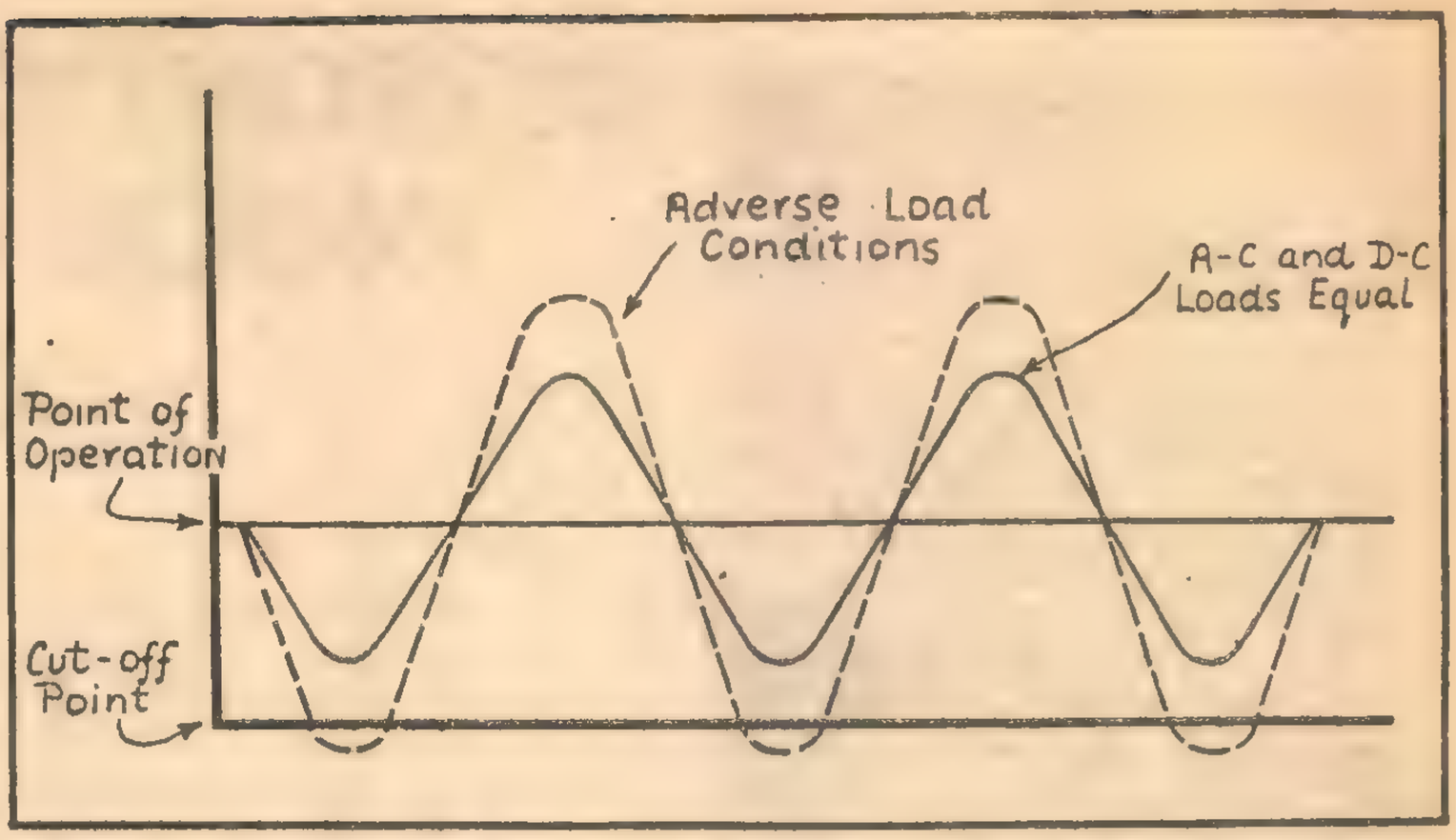

Figure 2. When the a-c and d-c loads are equal or nearly so the diode is able to operate over the linear portion of its curve. Under adverse loading conditions the current may swing beyond cut-off point with deeply modulated signals, introducing severe distortion.

The second form of distortion is even more dependent on circuit arrangement than that already explained. It depends entirely on the arrangement of the values of the component parts used around the diode detector circuit and, speaking generally, is responsible for quite a deal more distortion than the cause already explained.

The circuit of Fig. 1 shows the connections for a simple diode detector circuit. With the cathode heated, and a voltage applied to the anode, electrons move around through the circuit, making the end of the resistor connected to the tuned circuit negative with respect to the cathode.

OPERATION OF CIRCUIT

If an unmodulated signal is applied to this combination, the action of the diode is to cut off half of the radio frequency carrier wave, the other half initiating a current flow in the circuit.

The condenser across the diode load resistor tends to short this circuit insofar as radio frequencies are concerned, leaving only the d-c component to create a voltage drop through the resistor.

This means that with an R-F voltage applied to the anode, the end of the resistance nearest to the tuned circuit is negative, the voltage across the resistor being a d-c voltage. The amplitude of this voltage is approximately proportional to the amplitude of the R-F or I-F input.

When a modulated signal is applied to the anode, the end of the resistance nearest the tuned circuit retains a certain d-c potential, which, however, varies with the audio component. The condenser across the resistance, although short circuiting the resistance as far as R-F is concerned, does not do this for the audio frequencies, at which frequencies the condenser is ineffective.

COUPLING TO AMPLIFIER

In practice, the end of the resistor must be connected through a coupling circuit to the grid of the following amplifying tube, so that the audio frequency voltages may be amplified by the succeeding stages.

For convenience, the amplifying tube is shown as being entirely separate from the diode, but, of course, it may be included in the same envelope, as in a diode-triode or diode-pentode tube.

When the grid circuit of an amplifying tube is connected through a condenser to the end of the load resistance, the diode load resistor and the resistor in the grid circuit of the following tube are in parallel, insofar as alternating current or audio frequencies are concerned.

As far as the d-c component is concerned, the resistance in the diode load is the only one which is effective, but

(Continued on Page 56)

ADDITIONAL CONTROL

An improvement in the tonal quality of such receivers can often be effected by wiring in an audio gain control in addition to the R-F gain control, the audio gain being turned back for normal listening, R-F gain being advanced as required.

In the case of receivers employing A.V.C., distortion of this nature seldom occurs since the R-F gain is controlled automatically, and the panel volume control is always on the audio side. The way things work out, it is not at all unusual to find eight or 10 volts of radio or intermediate frequency voltage on the diode plate, sufficient to carry the modulation far above the

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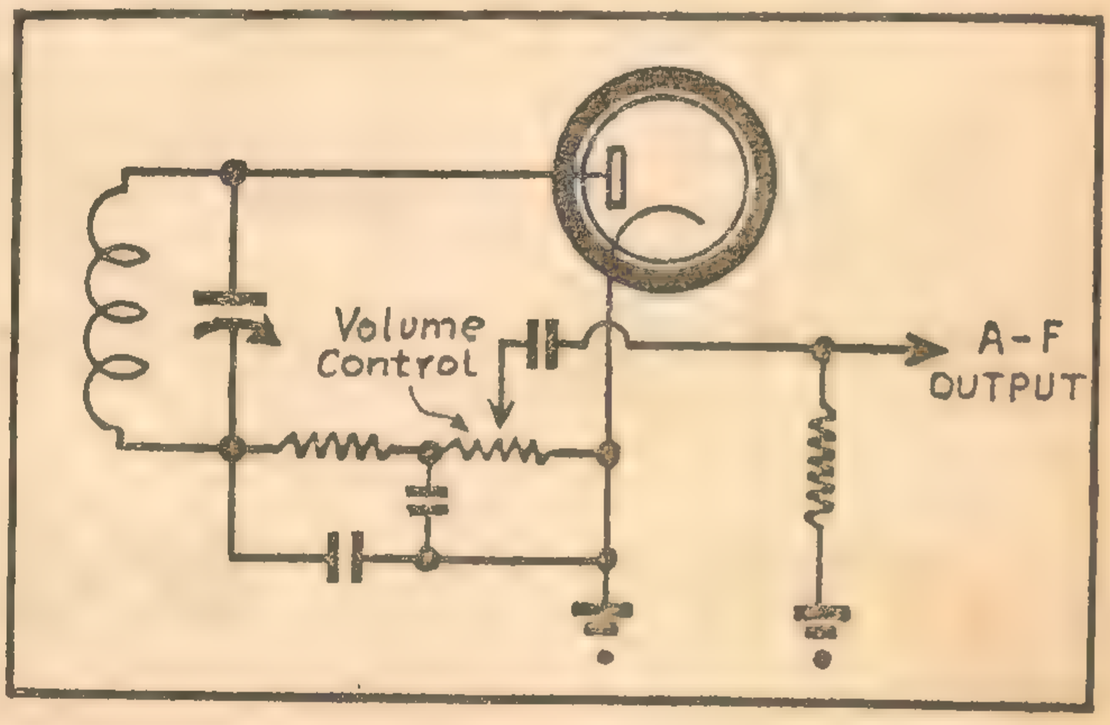


Figure 3. Loading conditions for a diode detector may be improved by arranging the circuit as shown, using the volume control as the diode load and a fixed resistor in the grid circuit of the following valve. The scheme has the minor disadvantage that there is greater tendency for the volume control to become noisy.

TAKE GOOD CARE OF YOUR TOOLS —

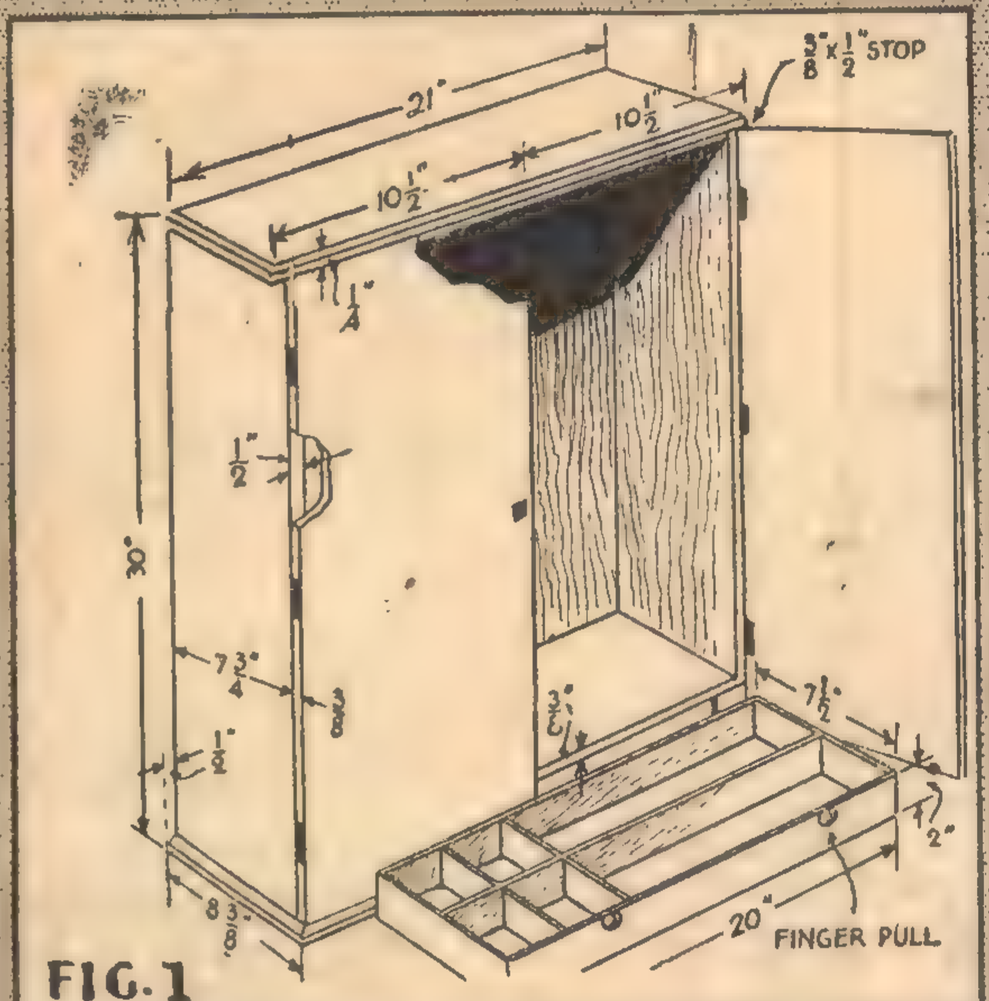


FIG. 1

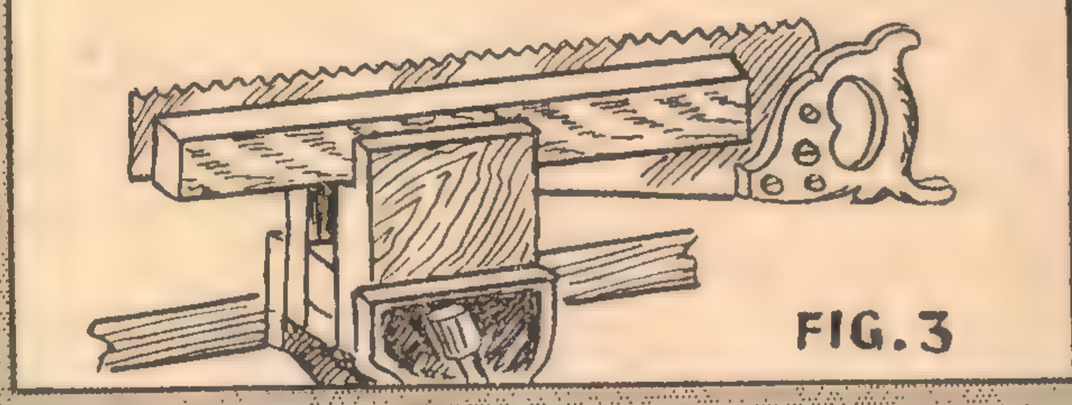


FIG. 3

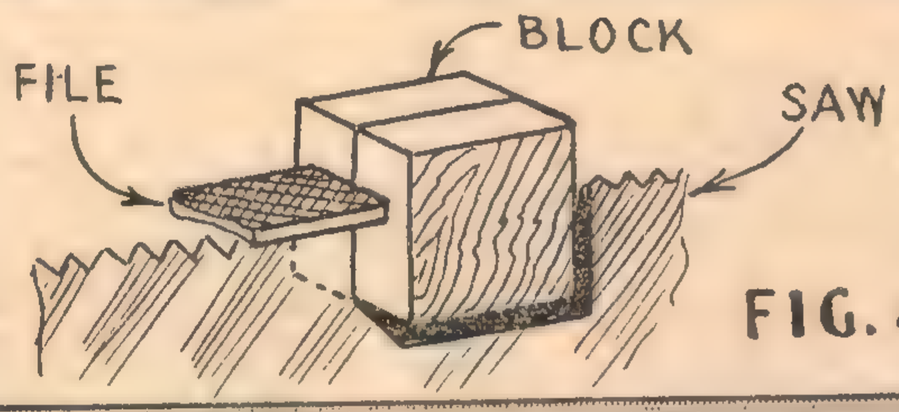


FIG. 4

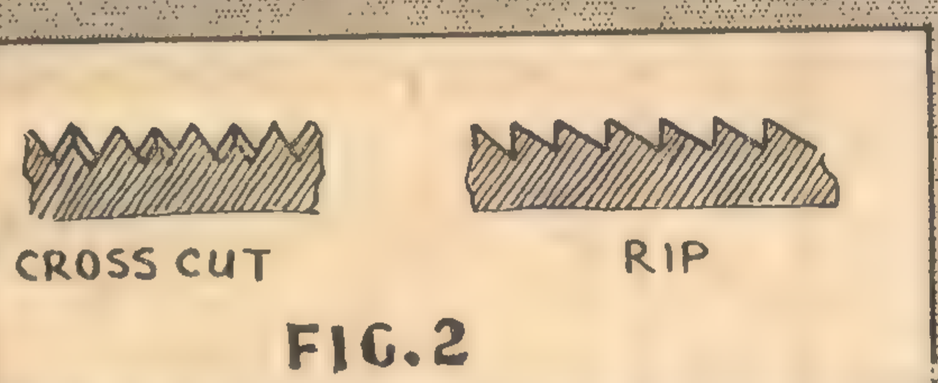


FIG. 2

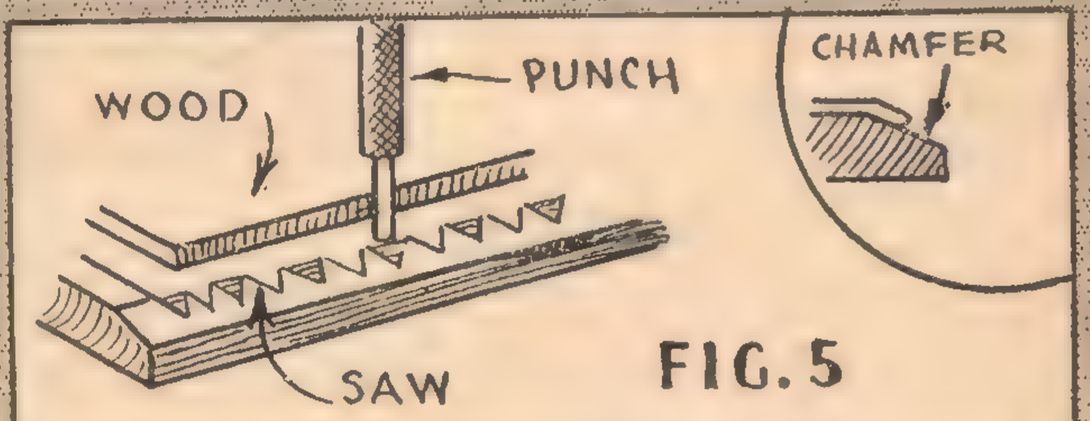


FIG. 5

Traditionally at least, Christmas is the time for the exchange of gifts and the expression of mutual goodwill. Perhaps we can stretch things a little and say that it is the appropriate season to give a little kindly and often much needed attention to the tools and gadgets around the home workshop—the tools which have brought so much pleasure in the past, and from which we expect further service in the new year.

by W. G. Nichols

THERE is no need to mention every item individually; once you get into the spirit of the thing, you will soon discover the things which need to be done. Tidiness and method are the secret of any home workshop. If your tools have hitherto reposed on makeshift shelves, set to work and make up a shadow board or, if you prefer it, the tool cabinet shown above.

For making minor repairs about the house, and building many of the articles described in "Radio and Hobbies," only a few elementary tools are required.

Perhaps the most important single tool is the hammer. A good hammer should be well balanced, properly tempered and correctly ground.

Saws should be carefully selected. Obtain two to start with, one for ripping and one for cross-cutting. A 22in. blade is probably the best length to select. Make sure the handle fits your hand comfortably; one that is too big or too small will cause unnecessary fatigue.

A Jack plane is most useful for all-round work. If you are in doubt when selecting this or any other tool, get one of well-known make, as it will always pay good dividends in lasting service.

Chisels are very necessary. At least four are required—1-8in., ¼in., ½in., and ¾in., being the most useful sizes. A mallet is also desirable, as it will help preserve the handles of your chisels.

A brace and five auger bits ranging from ¼in. to 1in. in diameter are a good investment. A ratchet brace, although dearer than the ordinary brace, will repay the extra cost the first time you have to drill a hole in an awkward corner.

A marking gauge, a metal square, and a good two or three foot folding rule are necessary for marking out the work.

Get three screwdrivers for light, medium and heavy work. Once again, a ratchet driver is a good investment if the pocket allows. For metal work you will need a selection of files and a rasp or two for wood-working.

A combination oilstone with one side fine and the other medium is re-

STORE THEM IN THIS HANDY CUPBOARD

quired to keep the chisels and plane irons in good condition.

These are the main items, but there are quite a few other odds and ends useful to the handyman, which are relatively inexpensive.

The details for a compact wall type tool cabinet with all necessary dimensions are shown in Figure 1, whilst the photograph shows the tool cabinet in use with the tools suitably installed.

Saws are things that need keeping in order, but the job of sharpening, jointing and setting a saw frightens most beginners—mainly because they do not know how to go about the job. Figure 2 shows the difference between a crosscut saw and a rip saw. The teeth are entirely different.

SHARPENING SAWS

In filing various types of blades the procedure must be governed by the condition of the blade. If the saw is being filed for the first time, and it has not been damaged in any way, it is likely that a mere touching-up of the points will be sufficient. A single-cut three-cornered file of a size to suit the teeth to be filed is most commonly used.

If the blade has been damaged by running into a nail, it is best to joint the blade slightly before setting. This is done by making a simple holder for part of an old file as shown in Figure 4. The object of jointing is to bring the length of all the teeth uniform before filing.

In setting, the saw should be clamped between two boards, the lower board being chamfered to the set desired. Each alternate tooth is then tapped into position with a purch. The saw is then reversed and the remaining teeth tapped into set.

In filing a saw, it is usually best practice to disregard individual teeth and to adopt a uniform stroke of the file. This makes it necessary to go from one end of the blade to the other several times, but the method will produce a really good job.

USING OILSTONE

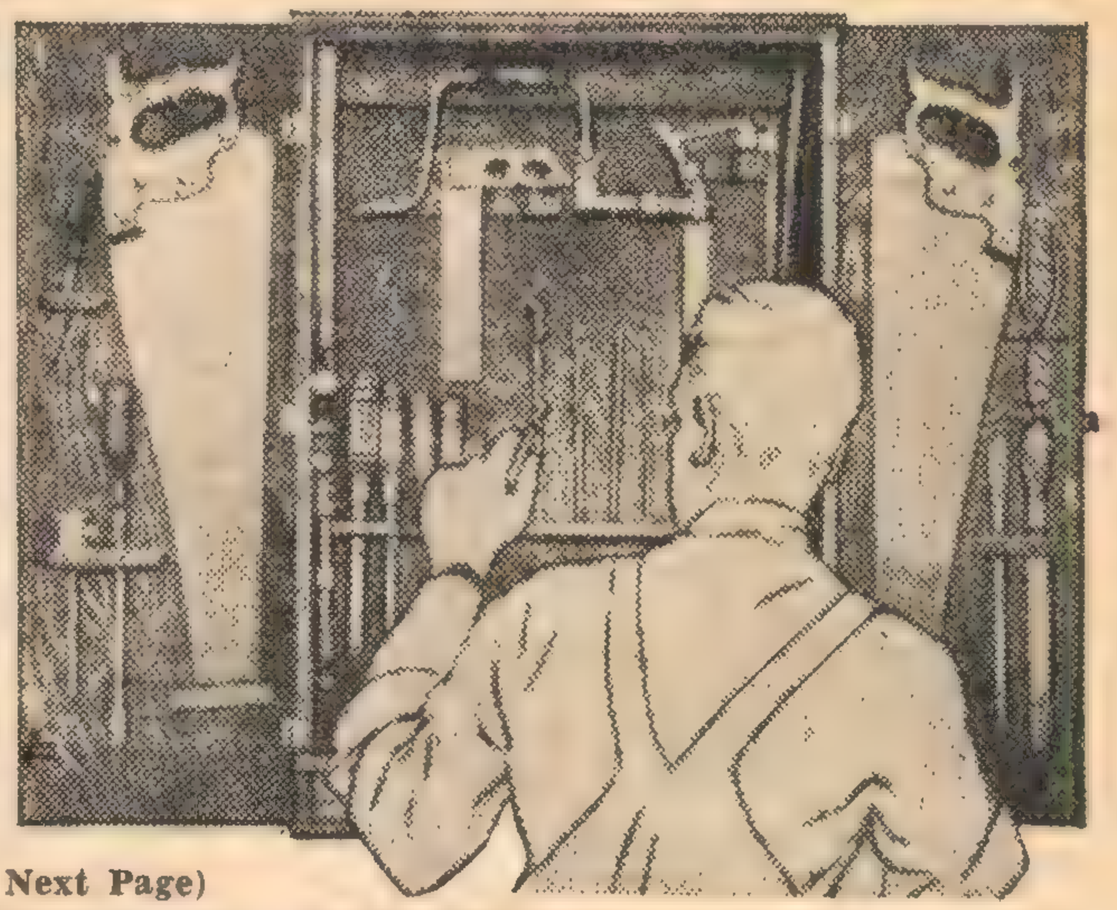
Pay attention to uniformity in the length and number of strokes given to each tooth and to the angle of the file with the blade. Clamp the saw blade between blocks before starting, as shown in Figure 3. After filing, the teeth should be lightly dressed with an oilstone.

Chisels should always be kept in trim. If the edge of the chisel has been badly nicked, grind out the nick with an emery wheel fitted with a tool rest. Be very careful to preserve the original angle of the edge.

If the chisel is blunt, but not chipped, the rough grind can be done on the coarser surface of the oil stone, bringing the blade to an edge and shaping the bevel.

When control of the blade is of secondary importance and it is necessary to take a deep cut in the wood with a minimum of friction, the grinding should produce a bevel of approximately 30 degrees, the full length of the blade. To be sure that the edge will stand up, grind a short bevel just above the cutting point to prevent the edge turning over.

For average work, the edge of wood chisels should be bevelled to approximately 35 degrees. This also applies to plane irons. After



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JOE'S COLUMN FOR JANUARY

HAVE you ever started out full of enthusiasm to do a job, only to have your spirits dampened somewhat by a certain necessary tool not being where you last left it? Then, after a lot of valuable time spent in looking for it, your enthusiasm has gone when the tool can't be found?

Of course, you have. We have all had those experiences. It may be our own carelessness in handling the tools or somebody else just coming and taking one and forgetting to return it. Then again it may be a little of each.

But whatever the cause of the trouble—a shadow board is the solution.

If you have a modest backyard workshop or if you are in charge of a large factory, you should have a shadow board. It is very simply constructed and, believe me, when you have one you can tell at a glance if you are short of any tools. You don't have to wait until you want a tool before you learn if it is missing or not.

Get all your tools together and lay them out neatly side by side on a large board, big enough to take them. Have each roughly about an inch apart. If you are sure the board is the right size to take all your tools, give it a good coat all over of some darkish color, say, a deep green. After it dries, place all the tools back on the board in their position and with a pencil draw a line around the outline of each tool. Remove the tools and then fill in the pencilled outlines with a paint that contrasts with the green, say, white.

When you have finished the paintwork, the board will present a picture of different tools. Now add some metal hooks or brackets, so that, when the board is placed above a bench or on a wall, each tool will hang in its own place, and while in position they will cover up their own shape in white. Naturally, when a tool is removed, the fact that it is being used and has not yet been returned stands out like a beacon for all to see. You get to know where each tool is and, believe me, it saves some time.

The idea is used in quite a lot of factories nowadays, but it is still a good idea for the home workshop. If your wife has a habit of taking the hammer and not returning it, the glaring white sign on the shadow board will tell all. It will be very easy to educate her that all will be happy, after a job is finished, if she doesn't leave any gaps on the shadow board.

DISTORTION IN DIODE DETECTORS

(Continued from Page 53)

when audio frequencies are considered it must be taken as a fact that the diode load and grid resistor are in parallel.

In other words, the d-c load for the diode is constituted by the single load resistor. What is generally referred to as the a-c load is necessarily less than the d-c load, being the resultant of the d-c load resistor in parallel with the grid return resistor.

The ratio of the a-c load to the d-c load determines the ability of the detector to handle deeply modulated signals. The ideal condition is reached when the a-c and d-c loads are identical in value, which means that the grid resistor is absent or of infinite value.

MINIMISE LOADING

Where the grid resistor must be included—and this is usually the case—it is important to see that the a-c load is as nearly as possible equal to the d-c load. Putting it another way, we have to minimise the external loading in parallel with the diode load.

The maximum d-c resistance which can be used in the grid circuit of the audio amplifying tube is limited by manufacturers' ratings, and is seldom higher than 1 or 2 megohms.

In many cases, where the importance of this point has not been appreciated, it is found that the grid return resistor, and possibly the A.V.C. feed resistor, connected in parallel with the diode load, reduce the a-c load to a small fraction of the d-c load.

Let us examine the effect of this:

The d-c current flowing through the diode load resistance produces a certain negative voltage, which is applied back to the diode plate; this d-c voltage fixes the point of operation for the diode, the instantaneous voltage varying about this value in direct proportion to the audio frequency component on the modulated carrier.

If the a-c load resistance is much lower than the d-c load, the current which flows in the circuit in accordance with the audio frequency signal will be very much greater than it would be if the two load values were identical—or, in other words, if there were no external circuit in parallel with the diode load.

Under certain circumstances, the audio frequency current amplitude may be so great that the point at which the diode cuts off is exceeded, and part of the pulsations which originally modulate the carrier wave, will be cut off, as represented in figure 2. This commonly introduces as much as 30 per cent. distortion.

A.V.C. FEED RESISTOR

To minimise this effect, while still retaining the circuit of figure 1, the grid resistor should be made as high as possible, consistent with valve ratings and other factors. A grid return resistor of 2 megohms in parallel with a diode load of, say, 0.5 megohm, would allow quite good results. Reducing the diode load to 0.25 megohm might help still further in the matter of quality.

If A.V.C. voltages are to be derived from the same point, the A.V.C. feed resistor constitutes yet another load in parallel with the diode load resistor and the matter is made much more difficult. From the point of view of quality, it is highly desirable to use a separate diode for the A.V.C. voltages, feeding it direct from the plate of the I-F amplifier through a small condenser.

If you are not satisfied with the quality of a particular receiver, it is as well to check up on these points and see whether you can reduce the external loading on the diode load.

Where the grid return resistor of the first audio amplifier must take the form of a volume control, it is usually impossible to use a value greater than 1 megohm, which represents the highest resistance to which ordinary carbon controls are at present made.

A circuit which has been used widely, and which avoids many of these difficulties, is shown in figure 3. Note that the volume control is made to serve as the diode load, a fixed resistor being included in the grid circuit of the following valve.

With a fairly high gain amplifier, the volume control is never turned up very far, except perhaps for weak signals, where quality is of secondary importance.

SHUNTING EFFECT SLIGHT

This means that the following grid return resistor is shunted across only a portion of the diode load and the effect is therefore very slight. If this scheme is used and the A.V.C. voltages obtained from a separate diode, the a-c load will be practically equal to the d-c load under ordinary circumstances.

The additional resistor and the two condensers are not essential to the scheme, but are inserted to obtain R-F filtering ahead of the audio amplifier.

The one objection to this scheme is that the volume control is required to carry a small d-c current, which sometimes has the effect of making the control noisy when rotated. However, with average good quality controls, this effect is not noticed.

In conclusion let it be said that much of the criticism levelled at diode detectors arises because of improper operating conditions. Given suitable conditions, the diode will hold its own with any other detector in the matter of quality and utility.

TAKE CARE OF YOUR TOOLS

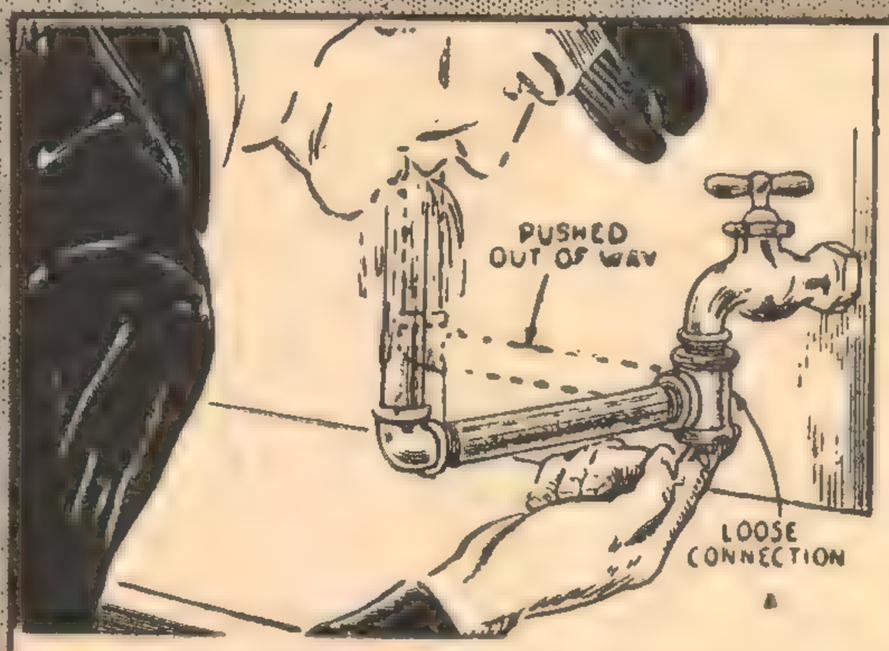
(Continued from Previous Page)

honing on the fine side of the stone, the plane iron should be turned over flat on the stone and given a few rubs to remove any burrs.

Go carefully over all braces and drills and give all moving parts a drop of lubricating oil. Also give chisel and saw blades a light rub over with an oiled rag for protection against rust.

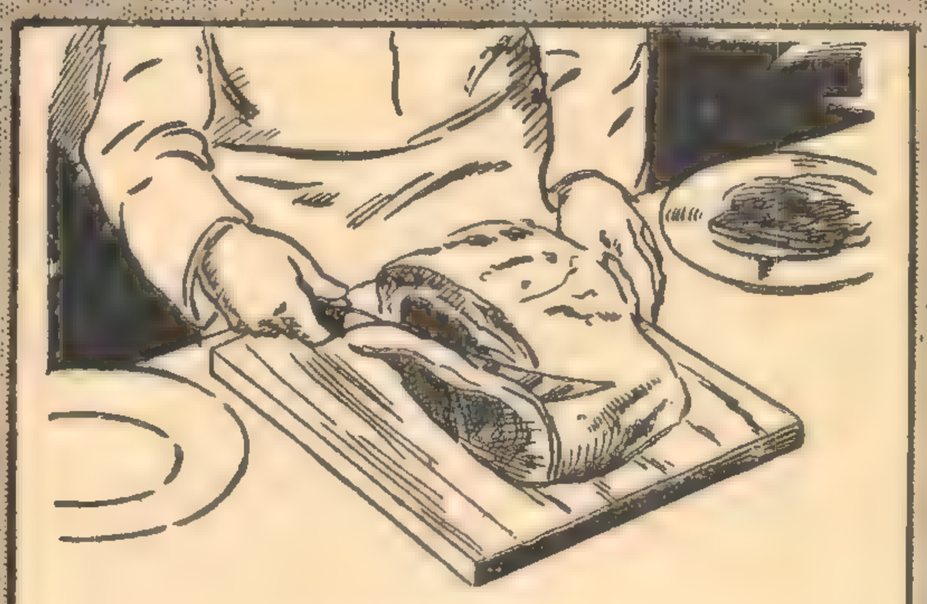
Check carefully over your materials; replenish your stock of glue, sandpaper, emery paper, hacksaw, and coping saw blades, and your screw and nail supply. You will then be ready for a fresh start in the New Year.

USEFUL HINTS FOR THE HOME HANDYMAN



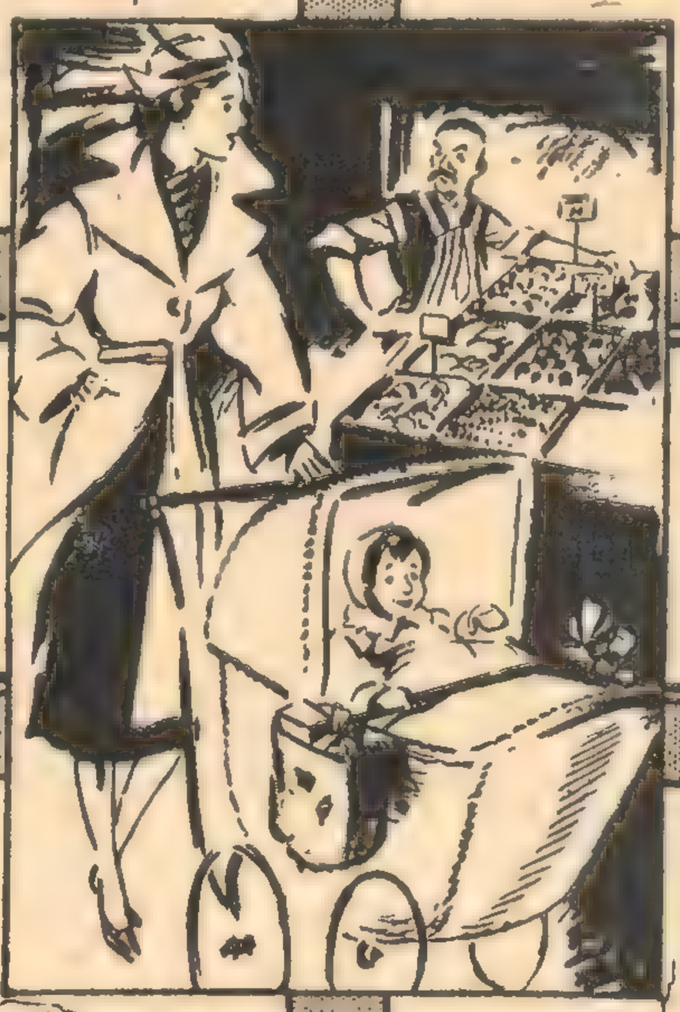
DRINKING FOUNTAIN

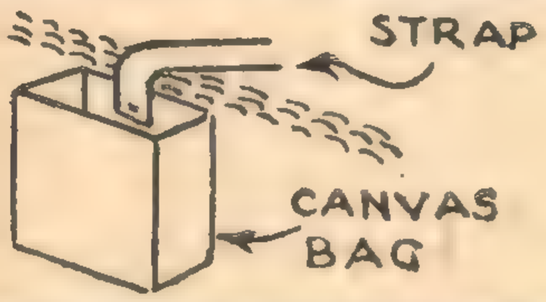
The pipe assembly shown makes a sanitary drinking fountain for the home workshop or garden. The fountain is attached to the tap with a loose tee to allow assembly to swing. To drink simply hold the thumb over the open end of the tee.



CARVING BOARD

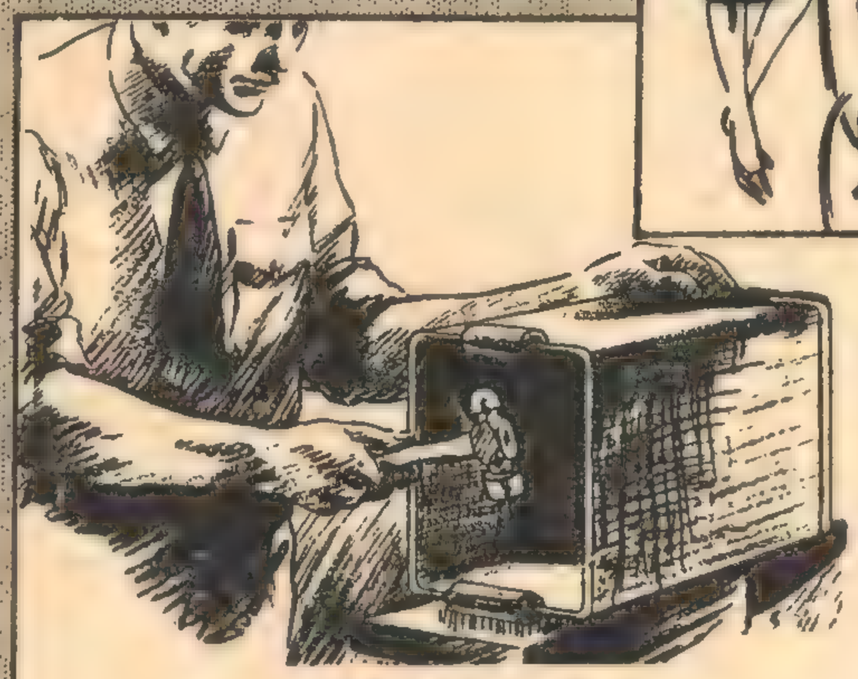
If a piece of ¾in thick wood of convenient size has two holes drilled through it, and two pointed dowels are driven through them, you will have a handy carving board. The two wooden spikes hold the meat firmly while carving.





NOVEL SHOPPING BAGS

Make two shopping bags of heavy canvas and join together by a canvas strap, as illustrated. A handy thing when mother takes the baby shopping in these days of cash-and-carry.



GARBAGE TIN

An old kerosene tin will make a handy rubbish container if the top is removed and rough edges hammered down flat. Handles are provided by slitting two short lengths of metal pipe and then hammering them on to the edge of the tin, as illustrated.

PICNIC HINT

When using the metal top of your thermos flask as a cup, don't get your fingers burnt when the liquid heats up the top. Make a paper cone that will fit the top snugly and you will be able to drink in comfort.

DX NOTES

BROADCAST BAND DX

by Roy Hallett

Judging by the number of reports received from our readers during the last few weeks, some particularly good signals are being received in widely scattered parts of this fair land of ours from the North Americans, around midnight. Some of these stations are heard at quite good signal strength in Western Australia.

ASIATIC stations are still plentiful, from the time our locals close till a few hours after midnight. Not so many of our readers this month have reported reception of the Europeans around sunrise. At my location they are still being heard fairly well, however, and should continue to be heard for the next few months.

I have not been able to do much in the way of DX for the last few nights, as old man static has definitely the upper hand. When static prevents me from hearing VUY, KSL, XGAP, 2YA, &c., I sometimes think that my location must be just about the worst on earth for DX. However, when I received recently a note from a Queenslander, telling me he cannot even listen to his local stations for static, I began to think that Enfield isn't such a bad spot for a DX'er to live, after all.

December 8, as we all know, marked the anniversary of the Japanese entry into the war, and from then on, one by one, quite a number of radio stations DX'ers have been hearing in this country for many years came under Axis control. Up to going to press, none of these stations have been retaken by the United Nations.

WELL KNOWN STATIONS

Quite a number of us have the attractive QSL card from ZHI, Singapore, picturing a setting sun. We remember the somewhat plain but well-worth-having cards from KZRM, KZRF, KZRH, Manila, and letters from KZIB, Manila, and KZRC, Cebu. The fine letters, often registered, and QSL cards from HS7PJ, Bangkok; Thailand, were always welcome. The receipt of a card or letter from any of the numerous Shanghai stations was always a thrill.

It is to be hoped that this time next year, many of our new DX friends will have not only sent reports to such stations as these, but will have had time to have received back their verifications. But that is in the hands of those grand chaps and nurses at the front, the hard workers here at home in our munitions factories, and our political and military leaders.

Perhaps some may be wondering why it is that many Mexican stations (transmitting from that country) have established their studios in towns and cities in US America, sometimes many miles distant from the transmitter.

Why so many individual stations have done this, I do not know, but in some cases it may be because the station has been refused licence by the USA Federal Communications Committee (the organisation controlling such matters in that country) to operate a station in the USA itself.

In such a case, should the owners be determined to open a station, they could possibly install their actual transmitting equipment in Mexico, not far from the USA-Mexico border, and broadcast in English from this transmitter. With sufficient power, the signals and advertisements broadcast could then be heard in the USA and perhaps Canada.

However, I have no definite information about the individual stations and I cannot classify them into their various categories. Some of these stations (XEAW, XEBG, &c.) are heard fairly well in this country.

QSL CARDS

Last month we described the attractive verification card sent out to listeners sending good, correct reports to the stations owned by the National Commercial Broadcasting Service, New Zealand. This time, we shall cover the stations of the National Broadcasting Service.

NCBS stations are operated on a commercial basis, accepting advertisements. Unlike our commercial or B class stations, they are owned by the Government; the NBS stations are practically the same as our National stations.

The New Zealand NBS send out a pink card, with station call, reporter's name, and other items printed in black. If the items reported by the listener correspond with the station's log, they definitely state this on the card, and that the reception of their transmission is hereby verified.

Stations in the NBS include—1YA, 2YA, 3YA, 4YA, 1YX, 2YC, 3YL, 4YO, 4YZ, 2YH. Locations and frequencies appear elsewhere in these columns.

KNX—Los Angeles, California, USA, 1070kc. This 50,000-watt (50 kilowatt) unit of the Columbia Broadcasting System issues quite an attractive card, printed on art paper, showing on one side a picture of the comparatively new building at Columbia-square, Los Angeles, housing the studios of KNX. On the reverse side, a brief message to the reporter, confirming their report, &c., is printed. The card is printed in black and white.

READERS' REPORTS

During the past few weeks, some very interesting reports have arrived here from different readers. The writer would like to acknowledge and thank the following for taking the time and trouble to send along a report: R. Gillett, Dudley Park, SA; H. Hull, Cabarlah, Qld.; F. Smith, Dry Top; R. Eisterhuizen, Milang, SA; C. Reid, Smithston, Tas.; D. Berndt, Wotha, Qld.; A. T. Cushen, Invercargill, NZ; Dr. Gaden, Quilpie, Qld.; L. Gliddon, Upwey, Vic.; R. K. Clack, Somewhere in Australia.

May I take this opportunity of extending the compliments of the season to reporters and to readers of this section.

DX reports for the February issue should reach Mr. Roy Hallett not later than Saturday, January 9, 1943. His address is 36 Baker-st., Enfield, NSW.

LISTEN FOR THESE STATIONS

Elsewhere in this issue may be found a complete list of Australian broadcast band stations. Here we present a list of some miscellaneous overseas stations, likely to be heard in this country.

Late at night, from the time our locals close till around 11 or 11.30, Americans and Asiatic stations may be heard; the Asiatics continue till around 2 or 3 am, some even later. The Americans usually fade out around 1.30 am or so.

Just prior to sunrise, and often a little later, Europeans may be heard, together with most of the New Zealand stations. Some NZ stations are also audible at night.

Figures refer to operating frequency in Kc/s.

—, 823, Bucharest, Rumonia.
2YA, 570, Wellington, NZ. Good at night, closes 10.30 pm.
KGKO, 570, Fort Worth, Texas, USA. Heard after 2YA closes.
KMJ, 580, Fresno, California, USA.
KGMB, 590, Honolulu, Hawaii. Good around 3.0 am.
KHQ, 590, Spokane, Washington, USA.
KFSD, 600, San Diego, California, USA.
KFRC, 610, San Francisco, California, USA.
610, Athens, Greece.
KFAR, 620, Phoenix, Arizona, USA.
KGW, 620, Portland, Oregon, USA.
620, Cairo, Egypt. Heard usually just prior to sunrise.
Approx. 630, India. Comparatively new, location as yet unknown.
—, 638, Prague, Czechoslovakia.
XGAP, 640, Peking, China. Usually fairly strong signal around 1 am.
KFI, 640, Los Angeles, California, USA.
1YA, 650, Auckland, New Zealand. Closes 10.30 pm.
XOJC, 660, Nanking, China.
LS4, 675, Buenos Aires, Argentine, Sth America. Closes 1 am.
KPO, 680, San Francisco, California, USA.
4YZ, 680, Invercargill, New Zealand.
XPRA, 690, Kunming, China. Strong station, usually from when 6WF closes at night.
—, 695, Paris, France.
ZOH, 700, Colombo, Ceylon. Not a very strong station.
WLW, 700, Cincinnati, Ohio, USA. Sometimes heard under 7NT.
KIRO, 710, Seattle, Washington, USA.
KMPC, 710, Beverly Hills, California, USA. Heard under KIRO.
—, 713, Rome, Italy, No. 1.
3YA, 720, Christchurch, NZ.
—, 724, Hilversum, Holland.
KQW, 740, San Jose, California, US, America.
KGU, 750, Honolulu, Hawaii. Good around 3.0 am.
VUT, 758, Trichinopoly, India.
KOB, 760, Albuquerque, New Mexico, USA.
KXA, 770, Oakland, California.
4YA, 790, Dunedin, New Zealand.
XELO, 800, Cindad Juarez Chih, Mexico. Studios in El Paso, Texas, USA.
VUC, 810, Calcutta, India.
KGO, 810, San Francisco, USA.
WBAP, 820, Fort Worth, Texas, USA.
823, Bucharest, Rumania.
HS7PJ, 825, Bangkok, Thailand. Is one of the strongest Asiatics.
KOA, 850, Denver, Colorado, USA.
—, 850, Sofia, Bulgaria. Usually a strong station.
—, 859, Strasbourg, Germany.
XEMO, 860, Tijuana, Mexico.
VUD, 886, Delhi, India.
XOJB, 900, Shanghai, China.
—, 913, Toulouse, France, "Radio Toulouse."
—, 922, Brno, Czechoslovakia.
KHJ, 930, Los Angeles, California, USA.
3ZR, 940, Greymouth, NZ.
—, 950, Breslau, Germany. One of the strongest Europeans.
KOMO, 950, Seattle, Washington, USA.
— 959, Paris, France, "Poste Parisian."
KOIN, 960, Oakland, California, USA.
KFWB, 980, Hollywood, California, USA.
— 1000, Saigon, Indo-China.
—, 1004, Bratislava, Czechoslovakia.
VUW, 1022, Lucknow, India.
—, 1031, Konigsberg, Germany.
—, 1059, Bari, Italy.
KNX, 1070, Los Angeles, California, USA. Usually a strong station.
1ZB, 1070, Auckland, NZ.
KRLD, 1080, Dallas, Texas, USA.
VUL, 1086, Lahore, India.
KPAS, 1110, Pasadena, California, USA.
KWKH, 1130, Shreveport, Louisiana, USA.
2ZB, 1130, Wellington, NZ.
XGOP, 1150, China.
4YO, 1140, Dunedin, NZ.
KSL, 1160, Salt Lake City, Utah, USA.
VUY, 1167, Dacca, India. One of the best Indians. News in relay with other Indians at 1.50 am in English.
—, 1186, Nice, France. Usually a strong station.
—, 1195, Frankfurt, Germany.
WOAI, 1200, San Antonio, Texas, USA.
3YL, 1200, Christchurch, New Zealand.
4ZB, 1220, Dunedin, NZ.
KYA, 1260, San Francisco, California, USA.
—, 1276, Radio Mediteranee, France.
—, 1357, Genoa, Italy.
—, 1397, Lyons, France.
FFZ, 1400, Shanghai, China. Uses plenty of French.
2ZA, 1400, Palmerston North, New Zealand.
3ZB, 1430, Christchurch, NZ.
KSTP, 1500, Saint Paul, Minn., USA.
WLAC, 1510, Nashville, Tenn., USA.
KGA, 1510, Spokane, Washington, USA.
KOMA, 1520, Oklahoma City, Okla., USA.
WKBW, 1520, Buffalo, NY, USA. Usually heard around 10.30 pm.
KFBK, 1530, Sacramento, California, USA.
WCKY, 1530, Cincinnati, Ohio, USA. Usually heard early at night.
XEBG, 1540, Tijuana, Mexico. Studios, San Diego, California, USA.
XEAW, 1570, Reynosa, Mexico. Studios, Dallas, Texas, USA.

ANSWERS TO CORRESPONDENTS

UNDER THE PERSONAL SUPERVISION OF THE TECHNICAL EDITOR

Temporary Suspension Of Query Service

OWING to office arrangements, it will be impossible for us to mail direct answers to technical queries received during the month of December and January. Our shilling query service will therefore be suspended during that period and any letters received will be held over until we are abel to deal with them. Ordinary queries will be answered in the normal way through these columns.

P.C.B. (Killara, NSW) has built up the PA—1 amplifier using a 2500 ohm. 3-watt resistor in place of the speaker field, feeding the output to a permagnetic speaker.

A.: If the series resistor mentioned is really only a 3-watt type, it is a wonder that it has not burned out long ago. The rating should be at the very least 10 watts. However, it will be quite OK as long as it lasts. Output valves, especially of the beam-power variety, often show color on one or two turns of the screen. This does not necessarily mean trouble. The fact that the valve shows up as doubtful on a tester might indicate that the emission is on the low side, but you need not worry if the amplifier performs as well as you say it does. Thanks for the subscription, which has duly been recorded.

D.L. (Geelong, Vic.) suggests that certain converter valves could well be used as electronic mixers, taking the place of non-available twin valves.

A.: For this purpose, the 6J8-G could probably be used quite OK, but we are not sure that the ordinary pentagrid converters such as the 6A8-G would be of much use. However, converters are so scarce at the moment that it would be inadvisable to encourage their use for other than their normal application.

J.M. (Hawthorne, Vic.) has built up a T.R.F. receiver, which performs quite well but which motorboats when the audio volume control is advanced too far.

A.: Basically, the trouble is that the receiver has too much audio gain. The circuit would be more conventional if the first audio amplifier stage were omitted altogether. However, you may be able to overcome the trouble and retain the present valves by decoupling the detector and first audio amplifier. Instead of feeding them direct from B-plus, feed them through a common resistor of about 25,000 ohms and bypass the point remote from B-plus with an 8 mfd. electrolytic condenser.

T.U. (Bendigo, Vic.) is anxious to add A.V.C. to a short-wave receiver which utilises a regenerative detector.

A.: The idea of obtaining the A.V.C. voltages from across the grid leak is not altogether an impossible one, but is liable to lead to a lot of trouble. Main difficulty is that the A.V.C. action may not be strong enough to prevent the detector plate circuit overloading on all but very lightly modulated signals. This does not happen with a diode since a control can be inserted between the output of the diode and the input of the first audio amplifier. Application of the A.V.C. voltage only to the R.F. stage would be rather inadequate but application to the regenerative first detector would have the disadvantage that variations in signal would effect the amount of regeneration. You may be able to use the scheme for partial A.V.C., but, for a really effective system, the receiver would need to be redesigned completely.

A.W.S. (Notts Well) is puzzled by the term, "gain," used in connection with receivers, and certain other terms.

A.: The term "gain" is similar in meaning to "amplification," and refers to the ability of a receiver to amplify or build up a weak signal. The amplified voltages may then be fed to a power stage in a receiver to operate a loudspeaker. "Power output" refers to the amount of power the said stage can deliver to the loudspeaker, assuming that the previous gain is sufficient to excite fully the grid circuit. Thus, gain and power output capabilities are both determining factors in what you refer to as the "loudness." "Selectivity" refers to the ability to separate stations transmitting on adjacent channels. "Tone" refers to the purity and quality of the output. You should not be required to pay more than 6d for your "Radio and Hobbies."

J.T. (Drummoyne) inquires as to the use of a power transformer as an output transformer for an amplifier.

A.: For a push-pull amplifier, an ordinary 60 or 80 milliamp power transformer makes quite a good output transformer, provided that the impedance ratio can be suitably arranged. Using the 385 volt secondary as the centre-tapped primary and the 240 mains winding as the output winding, the impedance step down is about 10.5 to 1. Therefore, for correct matching, it is necessary to arrange the speaker load so that it presents across the output winding an impedance equal to one-tenth the desired plate-to-plate load for the output valves under the particular conditions of operation. Thus, for, say, 5000 ohms P-P, the speakers would have to present a load of about 500 ohms.

J.H. (Dural, NSW) advises re a change of address and asks about a receiver which is subject to fading troubles and periods of distortion.

A.: We have duly noted the change of address. It is impossible to pin down the trouble to any particular cause, since there are so many possibilities. It could be due to a faulty valve or to a fault in almost any one of the components underneath the chassis. The failure of the dial to track all over the band indicates that the receiver may be in need of alignment. Frankly, we think that this particular job is one for the local serviceman.

E.W. (Wellington) notifies of a change of address and makes other comments.

A.: Your letter has been passed on to the subscription department. You could certainly strip down the gang condenser for short-wave tuning, but we will have to leave the coil details for you to work out. The idea of using a very small trimmer in parallel with the oscillator tuning is a very simple way of obtaining bandspread, although it becomes necessary to reset the gang very accurately each time if stations are to be received at the same places on the bandspread condenser.

J.C. (Belmore) writes to say that, after adopting certain suggestions of ours made in a recent letter, his receiver is entirely satisfactory.

A.: Thanks for writing, J.C. We are always glad to hear how readers get on with the suggestions we make from time to time.

D.D. (Mill End) has built up the battery-operated amplifier recently described and states that the results are very pleasing, being better than a class B amplifier which he has, built up around good quality components.

A.: We are pleased to note that the amplifier has been found to perform so well by comparison. We have an idea that this scheme will prove extremely popular with our country readers. Thanks for writing in.

N.T.W. (Mt. Perry, Qld.) asks a few questions in regard to the battery-operated amplifier recently described.

A.: Yes, type 1D4 valves could be used without change to the circuit. Pin 1 is fil. plus, pin 2 plate, pin 3 grid, pin 4 screen and pin 5 fil. minus. The amplifier would probably operate quite well from a carbon microphone, although the quality of most carbon microphones is not the best. For better quality low output types, it would be essential to add a preliminary stage of amplification. We are not keen on the idea of running the amplifier from light duty batteries; superdynes would be a cheaper proposition in the long run. Life would depend entirely on the operating conditions chosen, the volume level and the amount of running. As we explained in the article a class B amplifier stands or falls by the quality and suitability of the transformers used. The circuit you enclosed would certainly not have a better tone than the resistance coupled job, although it might give rather more power output. Pleased to note that the results with the 2-valve receiver are so encouraging.

H.W.H. (Mt. Schanck, SA) would like to see described a small electric motor to drive models.

A.: The appeal of an article along the lines you suggest is limited these days by the difficulty there is in obtaining the necessary materials, particularly the wire. It is one thing to make a motor which will rotate, but quite another to make one to drive models over a period of time.

R.L. (Brisbane) has a pickup which apparently distorts on heavy bass.

A.: From the information available, it is practically impossible to give a conclusive answer. The pickup may be of poor design or it may merely need new rubbers around the needle chuck. We assume that you have the pickup totally enclosed. If this is not the case, the sound of the pickup on the record may be heard above the sound from the speaker, with most unpleasant effects.

A.E.C. (Drummoyne, NSW) points out that there is an omission in the circuit of the "Little General" receiver on page 47 of the October, 1940 issue of "Radio and Hobbies."

A.: Yes, A.E.C., there is an omission. Simply add a 0.1 meg. resistor between the triode plate of the 6F7 and B-plus and the circuit will be complete. It would be quite in order to add also a .00025 mfd. bypass between plate and earth. Thanks for the appreciative remarks.

E.H.Z. (Finch Hatton) wants to know where he can obtain a text-book on the construction of violins.

A.: We inquired at two of the big bookstalls here and found that neither of them could help in the matter. However, we suggest that one of our readers may know something on the subject, in which case they could get in touch with you. (Postal address, E. H. Zarmel, Box 15, Finch Hatton.)

D.W.M. (Somewhere At Sea) has some nice things to say about "Radio and Hobbies" and the circuits and articles published from time to time. He is anxious to obtain coil data for a small short-wave receiver.

A.: Thanks, D.W.M., for the remarks and suggestions. With regard to the coil data, we regret that we have nothing on hand at the moment. However, we realise the call for data of this nature and intend to do something about it in the near future. In the meantime, why not experiment for yourself? It should not be a very difficult task for you. You could probably get a good guide from one of the amateur handbooks.

SHORT-WAVE REPORTS

R. G. Gillett (Dudley Park, SA): Very many thanks for the details of the card from KWID. Several have been received. Thanks for the log and the information on the new German. Regards.

A. T. Johnson (Maylands, WA): Thanks very much for the suggestions which you will see are being adopted in part. We cannot make anything of the query regarding WJQ. Will try to find out something of this one.

L. Johnstone (Croydon, NSW): Sorry that we were out when you called. Better luck next time. Will be pleased to get a report at any time.

A. T. Cushen (Invercargill, NZ): Your card to hand. You certainly get among those stations. Twenty cards in one month is very good going. Hope that the Brazzaville stations soon open up on their new frequencies. Hope you get the other cards you are expecting.

A. H. Duke (Longreach, Q): Pleased to welcome you to our ranks and hope that we will receive many reports from you. Will endeavor to obtain the information you need. Best wishes.

A. E. Moore (Brisbane, Q): Thanks very much for the letter. Will use the dope next month. Thanks for the wishes for the coming season. Regards.

A. Black (Rockdale, NSW): Yet another new reporter to be welcomed to our pages. Glad to hear that Radio gives you the pleasure and interest you need. When sending in reports, give a detailed account of what you heard over a period of at least half an hour if possible.

P. W. Brunt (North Sydney, NSW): Thanks for your letter and hope to hear from you again. Best wishes.

L. H. Poynter (East Brunswick, Vic.): Th aerial gives good results and you seem to be making the best use of the limited time at your disposal.

J. N. Paris (Prospect, SA): Hope that the receiver is once more doing its best for you. Thanks for the complimentary remarks about our magazine. Will expect a very large report next month.

B. Scott (Geelong West, Vic.): Thanks for the card which we will return very soon. There are many of these cards here now, but who was the first we have to find out.

L. Walker (Applecross, WA): Best wishes in your exams. We will go into the matter you mention as soon as we can. Keep up the good work.

P. J. Grigg (Geelong East, Vic.): The log you turn in is very interesting. You will find the 16-metre band very interesting. All the best.

R. M. Churcher (Devonport, Tas.): Glad to get your letters. Hope that in the near future you will get more time to devote to our hobby. Thanks for the information which we will use in the near future.

E. Larson (Footscray, Vic.): Welcome to our pages. We are always glad to hear from any of our readers and to get any suggestions they have. After all, these are your pages. Your home-made set delivers the goods.

R. J. Nolan (West Perth, WA): If you refer to the station list you will see further details of Radio Orange. Thanks for the very fine log.

J. B. Keenan (Randwick, NSW): You certainly were lucky to get the card. Thanks for the dope on the stations on the lower frequencies. We are glad to see that they are to be heard these days.

H. Perkins (Malanda, Q): Your usually good log received safely. Very glad to hear that you received the veri. Thanks very much for the information.

W. Harvey (Dubbo, NSW): Thanks for the letter. We do receive the stations you mention, but they are not so good here. You will see that we have dealt with the Indians this month.

R. K. Clack (Home Forces): Very glad to hear from you again. We hope to get that translation soon. Thanks for the comments. Am writing you in the near future. Regards.

G. D. Gilbert (Burwood, NSW): Your interesting letter to hand. We will welcome a log from you each month. You seem to have a penchant for the bigger sets. Will write to you soon. Best wishes.

Dr. K. B. Gaden (Quilpie, Q): Very glad to hear that the veris are still coming in over your way. Reception seems to be fairly good just now and we hope that it keeps up. Let us know when the low frequencies open up. Regards.

N. A. Hanson (Merrylands, NSW): Will be glad to hear from you while in the country, and hope that you will be able to try out the location. Thanks for all the kind remarks.

T. Muliens (Yarraville, Vic.): Nice work on the log. There are many good stations in the mornings these days. Hope you get among them.

A. Lee (Merewether, NSW): Sorry to hear of the mishap and hope that the wind will discriminate between your aerial in future. Will send the details you need. Regards.

M. Morriss (Merewether, NSW): Your letter received at last. Glad to learn that you are also getting cards.

J. D. Harrington (Cremorne, NSW): Glad to hear from you and hope that you will become a regular reporter.

Miss D. Sanderson (Malvern, Vic.): Always pleased to receive your report. Thanks very much for the sentiments expressed.

A. S. Condon (Laura, SA): We had missed your report last month. Hope that you will be able to send in reports for some time. The big surprise in your letter was your age. All the best.

AC1 Boyd (Somewhere in Australia): Very glad to hear from you and to learn that you also have a card from KWID. See notes.

Broadcast DX

L. Gliddon (Upwey, Vic.): Glad to know the course is coming along so well, Leigh; hope you do very well with it. Glad you are getting a few veries in these days. Hope you find the Australian station list in this edition of use and interest.

R. K. Clack (Somewhere in Australia): We shall certainly miss those regular reports from you. Hope it is not long before it's all over and you may get back into the game again. Glad to hear from you any time you feel like dropping a note.

C. Reid (Smithston, Tas.): Glad to have another note from you. Thanks a lot for the list of loggings. I hope I shall be of some help with the identification of those mysteries of yours.

Dr. Gaden (Quilpie, Qld): Always glad to hear from you Sorry static has been so troublesome. I wish I could shake him off here, too. Glad you received your QSL from CBM.

A. T. Cushen (Invercargill, NZ): Always pleased to receive those interesting reports of yours. Glad 4ZB's new channel is to your advantage.

Frank Smith (Dry Top): Thanks a lot for list of your loggings of stations not previously listed in these columns. Glad you are experiencing good reception from the Americans. Hope you found the list in December issue of additional Americans of interest?

R. Gillett (Dudley Park, SA): Thanks a lot for that fine list of loggings; hope you continue to pull them in.

Mrs. E. Eisterhuizen (Milang, SA): Glad to hear from you folk again. Glad to hear you managed to obtain that radio equipment all right. A SW station, ZRH, Pretoria, in South Africa, but doubt if anyone would get a QSL from them these days.

A. J. McDonald (Euroa, Vic): Quite a while since we have written to you, Alf; hope you don't get too much of a shock when you do get a note. How's the Portable going? Any veries lately? Graham Hutchins is here in Sydney these days.

N. H. Groves, ADXRC (Heidelberg, Vic): So your name is really Norm. I've heard you called "Gloomy" and Harry as well, and I used to think there were three of you, but Ted T. recently put me wise. Had the pleasure of a chat with Graham H. recently; he had some jolly fine things to say about you folk in Victoria.

H. Hull (Cabarlah): Yes, a great number of Americans changed frequency in March, 1941, I think it was. The lists in November and December issues should acquaint you with many of these stations' new channels. Glad to know you enjoy reading our DX notes.

J. A. Bate (Merriwa, NSW): Jolly glad indeed to hear from you. Yes, I'll bet it will not be long before you are sending along fine long lists of your loggings. Only too pleased to lend a hand with your reporting.

D. Spencer (Forest Range, SA): Those letters of yours are always welcome. Thanks a lot for those snaps! Jolly glad to know just how things are set up at your listening post. I note you are a swing fan. I shall have to lend you some of my swing recordings.

J. Tyler (WA): Glad to receive that SWL card from you; it certainly is an attractive card. Other readers wishing to swap cards may care to drop a line to Mr. J. Tyler, 232 Crawford-road, Inglewood, W. Australia.

A. S. Condon (Laura, SA): Always glad to receive those reports from you, Austin. Hope you will like being in uniform and that you will be able to keep up your DX-ing. Glad to know you had a note from Lucille, at WOAI; I have just written to her again.

D. B. Mudie, Noojee: Our Editor kindly handed your note on to me, and I was interested to know you logged the American police. Hope you continue to get good results with that new set of yours.

WANTED TO BUY, SELL OR EXCHANGE

READERS who wish to buy, sell or exchange goods are invited to insert an advertisement in these columns of Radio and Hobbies. The cost for such advertisement is 9d per line for a minimum of three lines, making the minimum charge 2s.3d. As regards space, it is reasonable to count seven words or letter groups per line.

FOR SALE or Exchange, Transformers, Chokes, Tuning Condensers, Valves, Valve Sockets. **Denis Triarchis, Rose Cafe, Southport, Qld.**

FOR SALE.—Overhead Cutting Gear and Cutting Head for Home Radio-gramophone recording, £4. **A. G. de Voogd, 14 Sixth-st., Port Pirie West, South Aust.**

FOR SALE: Stamp Collection, 1600 stamps, or exchange for Multimeter. Write **W. J. Fullerton, c/o J. R. Taylor, Trebonne, Ingham, Q.**

WANTED, 1 good second-hand 16mm Home Movie Projector. Suitable to operate from 12-battery. **H. F. Knight, Nana Glen, North Coast, N.S.W.**

WANTED TO BUY, Radio and Hobbies for July, August, and October, 1942. **Cpl. E. Mirovitch, 43 Kuring-gai Avenue, Turramurra.**

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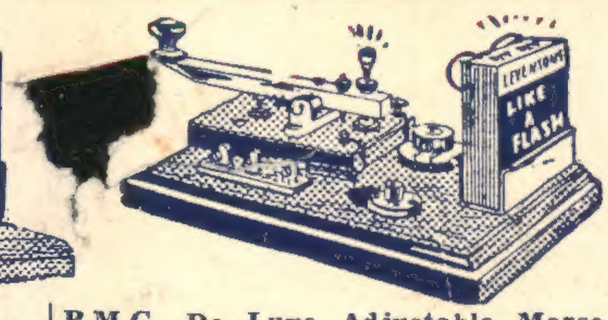

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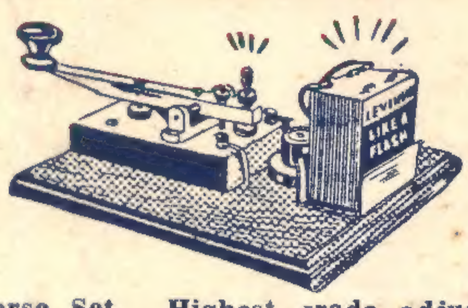

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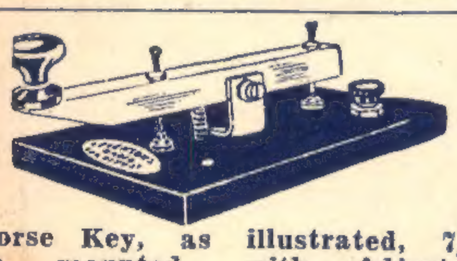

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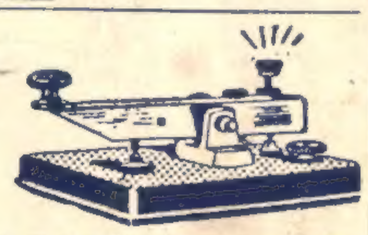

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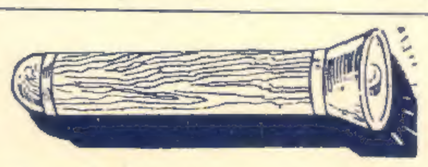

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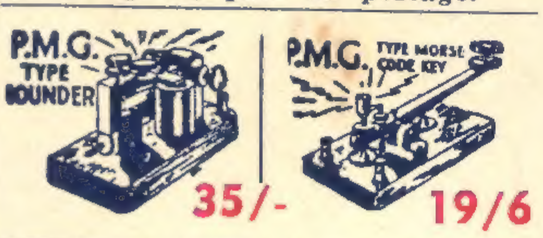

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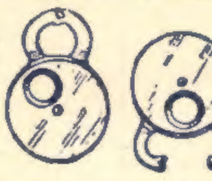

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